THE

AGRICULTURAL BULLETIN

OF THE

FEDERATED MALAY STATES.

No. 11.] SEPTEMBER & OCTOBER, 1918. [Vol. VI.

THE AFRICAN OIL PALM, ITS POSSIBILITIES IN MALAYA.

By B. J. Eaton and F. G. Spring.

A GREAT deal of interest is now being taken in the production of vegetable oils and new sources of supply. The African oil palm, *Elæis guineensis*, has attracted much attention lately and the Department of Agriculture, Federated Malay States, has received many enquiries as to the possibilities of growing this crop on a commercial basis in this country. It is evident that many capitalists are desirous of opening up land in Malaya for oil-palm cultivation and their chief reason for hesitation would appear to be lack of information on the subject. It is on this account that the writers consider the present time suitable for the publication of this article which it is hoped will, to some extent, assist prospective investors.

Distribution.

The palm is indigenous to West Africa, but is abundant almost all over tropical Africa and grows luxuriantly in most tropical countries. It is found in greatest abundance from Sierra Leone to the Cameroons. Dense forests are located in the coastal regions and in West Africa it does not occur thickly much beyond 200 miles from the coast, but it penetrates great distances into the interior. It is fairly widely distributed throughout the Malay Peninsula as an ornamental plant and in one or two instances small areas have been planted. It has been cultivated in the Botanical Gardens, Singapore, since 1895 while in the Gardens at Kuala Lumpur, there are a number of palms 14 years old and upwards. We are informed that on one estate in Sumatra it has been planted on a fairly extensive scale. In publication 2 of the Agricultural Department, Sumatra, 1918, the total area under this palm is given as just over 9,000 acres, which includes 15 estates in one district totalling 5,277 acres and 6 estates in another district totalling 3,750 acres.

The commercial supplies of palm oil are obtained mainly from Southern Nigeria, Sierra Leone, the Gold Coast Colony, the Cameroons, Dahomey, the French Congo, Togoland and Angola, but in recent years palm kernels have been exported from many other countries.

Description of the Palm.

It is unnecessary to furnish a botanical description of the palm, but a few remarks regarding its general appearance and habits will be of assistance to the planter. The palm is of slow growth and little or no stem is developed within the first two or three years but a comparatively good spread of leaves. The full grown plant may attain a height of about sixty feet. The stem is covered, throughout its length with the bases of dead leaves and bears at the apex a crown of large pinnate leaves, each of which may be 15 feet in length. The fruit is borne on the palm in large bunches known as "heads" or "hands" and are borne amongst the crown of leaves. On a five year old oil-palm area opposite the offices of the Department as many as 15 small bunches have been counted on one palm, but on a number of older plants, the bunches are fewer in number (from 4 to 12) but larger in size. The fruit varies from 1 to $1\frac{1}{2}$ inches in length and $\frac{3}{4}$ to 1 inch in diameter and is somewhat egg-shaped; it is reddish-brown or orange in tint and consists of three portions. The outside layer varies in thickness and is composed of a soft oily fibrous pulp. The palm nut is contained inside the pulp and consists of a hard woody shell, which may vary considerably in thickness, enclosing usually a single palm kernel, but it is not unusual to find two or even three kernels.

Selection of Land.

There is every reason to believe that the oil palm will thrive on most soils in this country which are capable of holding a fair proportion of moisture, but rich moist soils will probably give the best returns. Several acres near the offices of the Department are being grown on remarkably poor and light land and it is surprising how well they have done under the conditions. It would be expected that this crop would generally be suited to soils of the coconut type and this is probably correct, but remarkably fine specimens have been produced on gently undulating land and this is unquestionably to be preferred from point of view of costs. It is common knowledge that the drainage of coconut land is considerable, while on the other hand, gently undulating ground requires little or no expense in this direction, and, given equal returns, is to be preferred.

Preparation of Nursery Beds and Germination of Seed.

The oil palm is propagated from seed. The nursery beds should be raised, made of fairly rich humus soil and near a water course, if possible, to ensure the proper humidity of the soil. The beds must be well prepared as it is some considerable time before transplanting takes place. The period of germination varies very largely and it is of some importance to find out a method of promoting more rapid germination. In order to elucidate this question a number of experiments have been planned and are to be carried out when sufficient seeds are obtainable. Briefly these experiments consist of the planting of fruits, nuts and kernels under varying conditions, the preliminary treatment of nuts and kernels previous to sowing by immersion in lukewarm water and other substances and the bulking of fruits in a number of ways to increase the temperature. The planting in the nursery may be done at eighteen inches spacing and at a depth of about one and a half inches.

The beds require to be regularly watered in dry weather. When the seedlings are a foot high, or slightly over, they may be transplanted into their permanent quarters.

Transplanting.

This may be done when the seedlings are about one year old from date of germination; wet weather should be taken advantage of for the purpose. The seedlings are very hardy and can be transplanted with a certainty that the large majority will quickly recover, consequently only a small percentage of "supplying" is necessary. "Holing" similar to that in the case of rubber planting is recommended. The distance of planting may be 28 × 28 feet or 30 × 30 feet or about 50 palms per acre.

Weeding and Care of the Palm.

It is obvious that with the present position in regard to the cultivation of the plant in Malaya the writers can make no definite recommendations, but a number of factors have been noted which are of prime importance. Clean weeding and periodical cultivation around the palms are essential, but whether clean weeding throughout the area is necessary remains to be proved. At the junction of the leaf and stem it is customary to find an accumulation of vegetable matter and earth with the result that a growth of ferns and creepers, etc. is frequently found on the palm. It has been noticed that, where such growth on the palm is present, combined with weeds around the tree, the palms frequently do not bear fruit. The lower leaves must be pruned occasionally to permit of the proper development of the bunches; this may conveniently be done by means of a small sharp axe. Care must be taken not to leave a ragged edge and that the cut is made as near the trunk as possible and in a slanting direction to prevent accumulation of water. In other words the plant should be kept well trimmed and free from foreign matter.

Varieties.

Seeds of three varieties of the oil palm have been received from the Department of Agriculture, Nigeria. The varieties are "Microsperma," a soft-shelled variety; "Ope pankaro," a hard-shelled variety and King of the Fetish (Ope Ifa of Ibadan). In West Africa the palm nuts are almost invariably cracked singly by hand and for this reason the thin-shelled varieties are preferred. In *Nature*, Vol. 101, No. 2,546, it is stated that *Kew Bulletins* Nos. 2 and 3, contain an interesting account of experiments which have been made in breeding the West African oil palm both on the Gold Coast and in the Seychelles. The object in view in these experiments was to ascertain whether the soft-shelled variety of the oil palm would breed true, but it has been found that this is far from being the case under the conditions of the experiments. Palms grown from soft-shelled seed have yielded both hard and soft-shelled nuts even in the same bunches of fruit, and it is clear that no decisive results can be obtained until care is taken to hand-pollinate the flowers of a soft-shelled tree with pollen from a tree of similar character and to protect the flowers, as cross-fertilisation must be of constant occurrence. Not only is it desirable to produce nuts with

thin shells, which are easy to crack, but it is also necessary to breed varieties of palms which shall be prolific bearers of fruit, yielding the finest quality oils. Hitherto the oil palm has only been a wild crop, but it is of interest to note that recent attempts to cultivate it on the Gold Coast have met with remarkable success, the yield from palms grown in tilled soil at fair distances apart being more than three times as large as that from palms under native conditions. The establishment of plantations in the Federated Malay States and the Seychelles may therefore lead to far-reaching results, and under these more favourable conditions the oil palm may so flourish that the native industry, unless properly cared for, may collapse and disappear.

Cost of Opening up a Plantation in the F.M.S.

Actual figures are not available in this connection, but it is considered by the writers that the costs per acre would be slightly higher than that of bringing rubber into bearing, in both instances dealing with undulating land; under such conditions it would be cheaper than bringing a coconut property to the producing stage, which necessitates a high expenditure in most cases in regard to drainage.

Collection.

It is estimated that a cooly can collect about 30 bunches of fruit a day. The bunches do not all mature on any particular palm at one time, with the result that the gathering would require to be done, throughout an area, at intervals of about three months.

Possibilities of the Oil Palm in the F.M.S.

The industry is an attractive one from several standpoints. There is a very wide market for the oil which is required in vast quantity and the price in normal times is fairly steady. Unquestionably there are enormous reserves of the palm in Africa which are said to be practically inexhaustible, but it would appear that the industry there is handicapped in a number of ways, namely, by the lack of scientific cultivation, transport irregularity and uncertainty of labour supply and machinery. These are all questions of paramount importance. In Malaya, it would be possible to work a property on up-to-date lines, but how this will compare with the native industry in Africa is a matter which is very difficult to answer. Large areas could be opened up with little or no effect on the market and should its cultivation prove commercially profitable here there seems no reason why it should not ultimately assume large proportions. It is probably not advisable to throw too glowing a light on the prospects of local production of the oil, but at the same time possibilities are such that it is to be hoped the project will not be lost sight of. We are fairly confident that the soils and climate are admirably suited to its cultivation. There is undoubtedly a wide field for experiment before a sound basis is established for definite recommendations, but in the introduction and early stages of any new agricultural product, it is natural that experiment can only have reached the elementary stages and although the writers would have preferred to have more information at their disposal before publishing this paper, the public interest and the possibilities are such as to warrant the publication.

From observations at the experimental plantations it would appear that the palms commence to fruit in the fifth year, but as already pointed out the soil on which they are grown is poor and better returns could be expected on more suitable land. It is reported that a few palms in Selangor commenced fruiting in the fourth year and the writers are of opinion that this would be more general than the former figure. Small quantities of seed have been offered, in this country, from time to time, for sale, but there would be considerable difficulty in procuring, locally, large quantities of seed for planting purposes. Large importations of seed could be procured from Nigeria and the Department of Agriculture would arrange facilities for placing any such order.

Yields.—No figures are at present available for any considerable area of palms either in this country or in Sumatra.

The following West African figures are given to enable those who are interested in the cultivation of this product to compare results with the former. From the little information available on the yields in this country and in Sumatra under plantation conditions, much larger yields would be obtained than from the palm growing wild in West Africa.

In Nigeria an average of five bunches of fruits per tree per annum is obtained, and it is common to find palms yielding many more, as many as eleven being seen on a single palm at one time.

The writers have seen as many as twenty bunches on six year old palms in this country and a number bearing from twelve to fifteen bunches.

The following figures in regard to the composition of the "heads" or "hands" of fruit are quoted from West Africa:

Weight of average bunch of fruits ...	25—30 lbs.
„ fruit alone	16—20 „
„ stalk refuse	7—10 „
Average number of fruits per bunch ...	300
„ „ bunches per palm per annum	5
Density of trees per acre under estate conditions	50

Fruit per acre $= 18 \times 5 \times 50 = 4{,}500$ lbs.

Composition of fruit.—The average composition of the fruit is as follows:

Pericarp ...	30 per cent. =	Palm oil ...	18 per cent.
		Fibre and moisture	12 „
Shell of nut	58 „		
Kernel ...	12 „ =	Palm kernel oil	6 „

Palm-oil yields.—Assuming a yield of 4,500 lbs. of fruits per acre per annum, this consists of 30 per cent. of pericarp or 1,350 lbs. yielding 60 per cent. of oil corresponding to approximately 800 lbs. of palm oil per acre.

Palm kernel oil yields.—On the assumption that the kernel constitutes 12 per cent. of the whole fruit, which is a low estimate and based on the thick-shelled variety of seed, we obtain a yield of 540 lbs. of seed yielding 45 per cent. of oil or say 250 lbs. of palm kernel oil per acre.

The pre-war price of the palm oil being, approximately, £30 per ton (the present price of palm oil is £60-70 per ton, but the pre-war value has been taken as a sounder basis for calculation) the monetary yield per acre on the above yield of oil would be about £11 or $90. The value of the palm kernel at pre-war prices was about £22 per ton; on this basis the monetary yield per acre for the nuts would be about £5½ or $50 making a total of $140 per acre.

The above estimates are based on trees just after coming into bearing at the fifth or sixth year and would without doubt increase during subsequent years.

In regard to extraction of oil, particulars of machinery and capacity are given subsequently, but it might be mentioned here that it would probably not be economical to run a large oil expression factory except in the case of an estate consisting of several thousand acres, although suitable oil pressing machinery other than hydraulic expression plants particularly for treating the pericarp in the manufacture of palm oil, could, we believe, be used for smaller estates and such machinery might be suitable also for obtaining the palm kernel oil.

It might be mentioned that one local authority who has experience in the cultivation of this palm in the East places the monetary yields per acre, on a pre-war basis of values for the products at even a higher figure than that given above, amounting in the eighth and ninth year to nearly double the figures given.

Palm Oil and Palm Kernel Oil.

The products of the palm are palm oil and palm kernel oil.

The former is obtained from the oily fibrous and fleshy pericarp of the fruit, which surrounds a small nut, the latter consisting of a small kernel inside a hard shell, resembling a miniature coconut in appearance and hardness of shell. The kernel yields palm kernel oil.

Palm oil is a yellow semi-solid fat, while kernel oil, if properly prepared, is white and of a harder consistency than palm oil.

According to some authorities there are several varieties of the African oil palm, differentiated by the type of fruit.

The following figures abstracted from the *Imperial Institute Bulletin* give the composition of the fruit and various parts derived from different sources in West Africa:

Results of Analyses of Palm Fruits.

The following results were obtained at the Imperial Institute on analysis of a large number of samples of fruit from different parts of West Africa:

Source.	Fruit.			Nut.				Kernel.		
	Length. (ins.)	Diameter (ins.)	Weight (grms.)	Length (ins.)	Diameter (ins.)	Thickness of shells (ins.)	Weight (grms.)	Length (ins.)	Diameter (ins.)	Weight. (grms.)
Uganda ...	1.3-2.0	0.7-1.55	...	1.0-1.75	0.65-1.2	0.1-0.35	3.16	0.6-0.85	0.4-0.6	0.5-2.5
Nyasaland ...	1.4	1.0	12.0	1.0	0.7	0.15	6.2	0.6	0.4	1.1
Mozambique	...	...	...	1.1	0.8	0.15	6.7	0.65	0.5	1.6
Gold Coast	1.05-1.4	0.4-0.8	1.5-6.7	0.7	0.6	0.05 or less	2.5	0.5	0.45	1.1
,,	1.25	0.65	3.95	...	...	...	...	0.5	0.43	0.75
Calabar ...	...	...	8.9	...	...	...	3.75	...	...	1.13

The following table gives the composition of the fruit and nut:

Source.	Fruit.				Pericarp or pulp.			Nuts.		Kernels.		
	Pericarp.	Nuts.	Kernels.	Oil.	Moisture.	Oil.	Oil on dry pulp.	Shell.	Kernel.	Moisture.	Oil.	Oil on dry kernel.
	%	%	%	%	%	%	%	%	%	%	%	%
Uganda ...	...	...	...	...	...	...	...	83	17	8.2	46.3	50.4
Nyasaland ...	49	51	8.6	37.6	3.4	76.9	79.6	83	17	6.8	48.1	51.5
Mozambique ...	...	...	...	...	...	...	...	77	23	5.5	50.5	53.4
Gold Coast ...	72	28	12.5	44.8	14.5	62.2	72.7	55	45	...	...	...
,, ...	82	18	...	41.7	27.7	50.9	70.2	...	...	...	...	...
,, ...	30	70	...	...	5.0	72.1	75.8	70	30	...	...	...
Calabar ...	57.1	42.9	...	27.2	8.9	76.1	83.5	70	30	20.1	43.4	54.3

These figures show large variations in the proportion of pericarp to nut, while the oil content of both the pericarp (palm oil) and of the kernel (palm kernel oil) are fairly constant.

Palm Oil.

Until comparatively recently, the whole of the palm oil of commerce has been prepared in West African colonies, both British and foreign, by native methods, which are somewhat crude and wasteful.

Samples of the residual pericarp, obtained in the preparation of the oil in Lagos were examined at the Imperial Institute and found to contain 30 per cent. of oil, consisting chiefly of free fatty acids, showing the inefficiency of the native process of expressing the oil.

Preuss found in the Cameroons that, from 133 lbs. of fruit actually containing 30 lbs. of palm oil, only 8.85 lbs. were obtained in practice, showing a loss of over two-thirds of the oil. This means that 1,370 bunches of fruit of average size, instead of 405 would be required to be treated, to produce one ton of oil.

The fruit is borne on the palm in the form of large compact bunches known as "hands"; these bunches may contain as many as 400 fruits, but an average of at least 250 may be expected and the palms bear from 4 to 15 bunches of fruit per annum in the case of mature plants.

The bunches are cut from the palms by means of sharp cutlass-like knives and according to the native method of preparation of palm oil, the fruit is buried in the soil and allowed to ferment for periods up to 10 days in order to soften the pericarp by destroying or reducing the fibrous portion to a soft condition. The fruits, when sufficiently fermented, are removed from the stalk, mixed with mud and water and stamped under foot by the natives. The dirty brown liquid mass, when considered to have been pressed sufficiently in this manner, is transferred to boiling pots, varying in capacity from 5 to 80 gallons or more, and the mass boiled for about an hour and then allowed to cool somewhat.

The palm oil and fibrous pericarp rises to the surface of the muddy water mixture, while the nuts and mud sink to the bottom.

The mixture of pericarp and oil is then squeezed by hand to separate the oil, the latter being allowed to drop back into the pans.

When all the pericarp has been removed in this manner, the oil floating on the surface of the water in the pot is scooped or skimmed off by means of small tins and placed in empty kerosene tins or calabashes of different sizes for marketing.

Another method, described in the *Imperial Institute Bulletin* (1909, Vol. VII, p. 385) is as follows:

The bunches, after collection, are left for a few days, and the fruits are then chopped out and piled in heaps on a paved or cemented basin of about eight feet diameter, having a wooden tube from the bottom connected to a well near.

The fruit is covered with leaves and allowed to ferment for five or six days and then uncovered and pounded with poles for several hours. The mass is again covered up for two days and again pounded. This operation is repeated by a further two days' fermentation and subsequent pounding. The oil from the first and subsequent poundings flows into the well and is removed by small calabashes. When the flow of oil ceases, the nuts are picked out of the fermented mass of pulp and the latter is boiled to separate more oil and finally squeezed in a primitive press. By the native methods only about 12 per cent. of palm oil is obtained, although the fruits contain from 16 to 20 per cent.

The nuts are then sun-dried, which causes the kernel to shrink and become detachable from the shell.

The nuts are cracked by hand between two stones. Only about 4 lbs. of kernel can be prepared per day in this way.

As would be expected, the oil, prepared in this crude manner, contains both dirt and water and the buyers carry out fairly crude tests by heating the oil and judging the amount of dirt, etc., present.

The oil from West Africa is shipped in wooden casks, which are white washed, in order more easily to ascertain any leakage, which quickly discolours the whitewash.

Grades.

Three grades of palm oil are shipped from West Africa, known as Lagos, soft and hard.

The first-named is sold as containing not more than 2 per cent. of dirt. If exceeded, all excess over 1.5 per cent. has to be allowed for, in buying and selling.

Soft and hard oils are sold on a 2 per cent. purity basis, *i.e.*, allowance is made for all dirt, etc., in excess of 2 per cent.

Market Values of Palm Oil.

The pre-war market values of different grades of palm oil are as follows:

	Quality.	£ s. d.	£ s. d.	
Lagos palm oil	Soft ...	31 5 0	to 31 10 0	per ton (1913)
Bonny (old) Calabar and Opobo	„ ...	30 10 0	„ 30 15 0	„ „
Cameroon	„ ...	30 0 0		„ „
Niger, New Calabar ...	Hard ...	27 17 6		„ „
Saltpond, Appam, etc....	Very poor and hard	25 10 0		„ „

The variation in market value from 1906 to 1913, in the case of the best quality of oil—*viz.*, Lagos oil, is as follows:

Average price per ton.

1906.	1907.	1908.	1909.	1910.	1911.	1912.	1913.
£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
30 0 0	31 10 0	26 7 6	27 17 6	36 10 0	33 2 6	32 17 6	31 12 0

Other grades are proportionate in value, during the different years. The essential difference between what are described as "soft" and "hard" oils, is that the latter contain an excess of free fatty acids and consequently less glycerine, since the excess of free fatty acid and deficiency of glycerine is due to an actual decomposition of the oil, owing to faulty preparation, excessive fermentation of the nuts, etc.

With regard to quality of the different grades in respect to contamination with water, dirt and other impurities, this varies from 0.4 to 1.4 per cent. in the case of Lagos oil and from 4 to 12 per cent. in the case of Saltpond, Appam palm oil, etc.

Chemical Analysis of Palm Oil.

The actual analytical figures for palm oil vary considerably, owing to methods of manufacture, fermentation of the fruits during transport and during the process of preparation.

The following figures illustrate the differences which obtain between the highest and lowest grade West African product:

	Lagos (soft) per cent.	Saltpond (hard) per cent.
Impurities (water and dirt) ...	1.0	5.0-20.0
Glycerine (calculated from the glycerides)	9.0-10.0	1.5- 2.0
Free fatty acids	8.0-20.0	80.0-90.0

These figures show that, in the worst qualities, almost the whole of the fat has been decomposed into free fatty acids, and in view of the fact that crude glycerine is worth about £50 per ton (1913) the decreased market value of low grade oils can be readily understood.

The following analytical figures for palm oil are from the *Imperial Institute Bulletin* (Vol. VII, No. 4, 1909.)

Specific gravity (at 15°/15°C.) ...	0.9209 -0.9245
Solidifying point	31°-39°C.
Melting point	24.0°-42.5°C.
Saponification value	196.3 -205.5
Iodine value	53.0 -57.4
Reichert-Meissl value	0.86 -1.87
Hehner value	94.2 -97.0
Solidifying point of fatty acids ...	35.8°-46.4°C. (usually 44.5°-45.0°C.)

As will be seen above, the figure which varies within wide extremes is the free fatty acid content, which depends entirely on the method of preparation. The pericarp probably contains an enzyme which splits up the oil on pressing; subsequent decomposition is also brought about by the agency of micro-organisms, unless the fresh fruit is first heated and the oil also sterilized.

Uses of Palm Oil.

Palm oil is used principally for the manufacture of soaps and candles, and large quantities are said to be used in the manufacture of tin plate. The heated iron plates are covered with palm oil to prevent oxidation before being dipped into the molten tin.

It is also used to some extent in the manufacture of margarine and as a lubricant on a large scale by the railway companies for greasing the axle boxes of the carriage wheels.

Scientific Methods of Manufacture of Palm Oil.

By the native method of manufacture in West Africa, only from 30 to 50 per cent. of the oil present in the pericarp is said to be obtained, but during recent years, suitable machinery has been perfected for the more efficient expression of the oil. For this purpose, a suitable machine, for stripping the pericarp from the nut, is essential, since, after efficient separation, the oil can be expressed by the usual type of hydraulic presses or extracted by solvents such as carbon tetrachloride or trichlorethylene, which are used on a commercial scale in the case of other oil seeds.

An important point, as will be seen by reference to the analytical figures given, is to treat the fruit as soon as possible after collection.

Machinery for the purpose is said to have been invented and patented by several individuals or firms.

Cost of Machinery for expression of Palm Oil.

The following data may be taken as a basis in estimating requirements of machinery:

Palm oil in pericarp	...	18 per cent. calculated on whole fruit.
Palm oil expressed from pericarp	...	16.75 per cent. calculated on whole fruit.
Palm nuts	... ...	70 per cent. of whole fruit.
Palm kernels	... ...	12 „ „ „ „

A mill to treat 6,000 tons of fresh fruit per year of 300 working days of 10 hours each and producing 1,000 tons of palm oil on the above basis, together with 4,200 tons of nuts (containing 720 tons of kernels)

Approximate pre-war price ... £15,000 (includes buildings, stores, etc.).

This does not include nut-cracking machinery or machinery for obtaining palm kernel oil, it being assumed that the palm nuts are exported as such.

Cost per ton of Palm Oil.

	£ s. d.
Interest on capital (£15,000) at 5 per cent. per annum	750.0.0
Depreciation of machinery, buildings, etc. at 10 per cent. on original cost	1,500.0.0
Salary, etc., of two European superintendents ...	1,000.0.0
Native labour in mill	720.0.0
Cost of palm fruit delivered at mill at 20*s.* per ton ...	6,000.0.0
Cooperage at £2 10*s.* per ton of oil, including casks and transport of empty casks and setting up ...	2,500.0.0
Transport of oil and casks to Europe (say 1,150 tons) at £2 per ton	2,300.0.0
Total ...	£14,770.0.0
Deduct price of re-sale to natives of palm nuts at 10*s.* per ton	2,100.0.0
Total cost ...	12,670.0.0
Staff expenses, director's fees, office rent, etc., at £3 per ton of oil	3,000.0.0
Total cost for 1,000 tons of oil ...	£15,670.0.0

or, say, £15 13*s.* 4*d.* per ton of fine soft oil delivered in England.

Note: As far as this country is concerned, extra allowance would have to be made for cost of native labour and freight on machinery.

Against this, however, it is considered that one superintendent would be sufficient to run a factory of this size, or that two could run a factory of at least double the capacity.

The capacity of the above mill is also very small, and the running charges, superintendence, office expenses, etc., would be considerably reduced in proportion, in the case of a larger mill.

Palm Nuts and Palm Kernel Oil.

The utilization of the palm nut for oil purposes was not commenced as early as the production of palm oil from the pericarp, but has since developed extensively in West Africa where palm oil is produced.

The native method of cracking the nut is very crude and expensive and is carried out chiefly by women and children.

After removing the pericarp and palm oil, the nuts are placed on the ground and exposed to the sun, in order to dry and shrink the kernel; it is stated that this treatment should last three to four months Another method practised is to dry and shrink the kernel artificially by placing them on bamboo racks over fires, but this is said to affect the quality and yield of oil.

The dried nuts are cracked by placing them on a large block of wood, about 8 inches in diameter and 20 inches long, which is let into the ground about 3 inches to steady it. The nuts are placed in small holes or indentations in the top of the block and are about $\frac{1}{4}$-$\frac{3}{8}$ inch deep; they are cracked separately by means of a piece of iron about $1\frac{1}{2}$ inches wide, $\frac{1}{2}$ inch thick and 6—8 inches long, operated by a woman or child.

The kernels are either picked out by hand and placed in baskets, or separated by floating them out in a mixture of water and clay, of sufficient density to cause the kernels to float.

Cost of Cracking by Hand Labour.

By the native methods described above, about $\frac{1}{2}$ bushel or $23\frac{1}{2}$ lbs. of kernels can be prepared per day at a rate of 1*s.* (one shilling) per day. This amounts to £4 15*s.* 4*d.* per ton of kernels.

As a rule, however, the West African native does not hire himself out to crack nuts, but includes his labour in the sale price of the nuts.

In West Africa the native sells his kernels to a middleman who deals direct with the European factories.

Exports of Palm Kernels.

The export of palm kernels from West Africa appears to have been very largely to Hamburg and Harburg with considerably smaller exports to Liverpool.

The exports to Germany increased from 151,105 tons in 1906 to 256,668 tons in 1910 and the exports to England ranged from 25,280 in 1906 to 23,826 tons in 1910.

The following table shows the increase in exports and value of exports from 1904 to 1911:

Source.	1904. Exports tons.	1904. Value. £	1911. Exports tons.	1911. Value. £
Sierra Leone ...	25,101	213,731	42,892	657,348
Gold Coast ...	10,967	86,586	13,254	175,891
Southern Nigeria (including Lagos) ...	139,788	1,278,394	176,389	2,574,405

A rise of about 26 per cent. in total exports is seen to correspond to an increase in actual value of more than 100 per cent.

All palm kernels imported into the Continent or England are sold on a five per cent. purity basis, *i.e.*, five per cent. is allowed for shell and dirt, whether present or not, and a deduction is made for all excess over five per cent.

The difference in value per ton of the various grades of palm kernels is small, but the value has increased from £13 11*s.* 8*d.* per ton in 1908 to £22 7*s.* 6*d.* in 1913.

Commercial Uses, etc., of Palm Kernel Oil.

The palm kernel contains 45-50 per cent. of oil which is used in the manufacture of butter substitutes, margarine, chocolate, candles, lubricants and soap. The first and last of these are the most important.

The residual oil-cake is used as a cattle food and was worth £6 10*s.* per ton in 1913.

The kernels are shipped from West Africa in bags or in bulk, chiefly the former; about 14 bags constitute one ton of kernels.

The jute bags used as containers cost 6*d.*-7½*d.* in West Africa and the freight costs in 1913 ranged from 23*s.* 6*d.* from Nigeria to 35*s.* 0*d.* from the Congo to Liverpool or Hamburg.

The shells are used locally as fuel and could be utilized to a large extent for steam raising in a local oil factory.

About 600 to 1,000 tons of shells are said to be shipped to Liverpool annually, but for what purpose is not stated.

A number of samples of kernels examined at the Imperial Institute varied in oil content from 51 to 57 per cent. calculated on dry kernels; twenty-two commercial samples of kernels investigated by Nordlinger (1895) showed a variation of 46.7 to 52.5 per cent.; these figures indicate that the variation is not great.

The oil is normally a solid white fat which is said to turn rancid very readily.

The following table shows the average analytical constants:

Specific gravity at 40°/15.5°C. ...	0.9119
Solidifying point	23°-24°C.
Melting point	23°-30°C.
Saponification value	242.4-254.8
Iodine „	10.3-17.5
Reichert-Meissl „	5.0-6.8
Hehner „	91.1
Solidifying point of fatty acids ...	20.0°-25.5°C.

Cost of Modern Mills for Nut-Cracking.

It will be seen by reference to the cost of a mill for producing palm oil, quoted previously, that 4,200 tons of nuts yielding 720 tons of kernels are produced per year of 300 days.

A nut-cracking plant to deal with the above quantity, treating about eight tons of kernels per day, and using one nut-cracking machine, with necessary elevators, winnowing machines, screens, brine baths, etc., would be working during 90 days of the year.

It is stated that the extra capacity of cracking machinery is preferable, as it is found more economical in practice to deal with large quantities at one time than to have a plant of the capacity to deal with only the quantity of nuts produced daily by the plant for manufacturing the palm oil.

The cost of this plant (pre-war prices) including bungalow for an assistant engineer, nut stores, building for machinery, kernel store, etc., delivered and erected in West Africa is stated to be £4,200, assuming steam for motive power to be obtained from the palm-oil machinery.

Assuming, however, that machinery is required for dealing with the nut only, the cost including boiler, etc., would be £5,000.

Details of Machinery for Preparation of Palm Oil.

The first power-driven machinery for cracking palm nuts is said to have been introduced into West Africa in 1877 and devised by the firm of Mather & Platt, Liverpool. Hand machines were introduced 15-20 years later.

In this country the problem of machinery is not the same as in West Africa where the palm exists as a forest product, over large areas, on some of which the palm may exist to the extent of only a few per acre, and portable hand machinery is essential for native use. In the case of estates, where the palm would be planted to the extent of at least 50-60 per acre, a central factory with power-driven machinery would be more economical.

In this article, however, it is considered desirable to give all the information available in connection with suitable machinery, both hand and power-driven.

Nearly all of this information is derived from various numbers of the *Bulletin of the Imperial Institute* from 1909 to 1917.

Haake's Machines.

In 1904, prizes were offered by the German Government for the invention of portable machinery and the firm of F. Haake, Berlin, devised three machines, said to give fairly satisfactory results. The machines were (1) depulper for removing the oily pericarp from the fruit; (2) a press to express oil from the separated pulp; (3) a centrifugal nut-cracking machine.

The depulper consists of a shaft with triangular metal blades mounted obliquely on it, and rotates inside a cylinder which also rotates in the same direction, but at a different speed. It is claimed that one man can remove the pulp from 4.4 lbs. of fruit in five minutes in this machine.

The presses can be worked by hand or hydraulic power and since the oil is semi-solid it is preferable to heat the pulp and press, before working.

In a trial run, 22 lbs. of fruit yielded 14.85 lbs. of nuts in the depulper and from the pulp 2.2 lbs. of palm oil was expressed equivalent to about 83 per cent. of the oil present.

In the centrifugal nut-cracking machine, the nuts are projected from a rapidly rotating holder against iron plates; the machine is said to treat 506 lbs. of nuts per hour.

A set of five depulpers, one press and one nut-cracking machine cost in 1909 from £165 to £185, the former price being for a hand-press and the latter, hydraulic. This machinery has been actually installed in the Cameroons.

The Miller Nut-Cracking Machine.

A good nut-cracking machine, which the writer has seen at work, is that of Miller Bros., Liverpool.

The Agricultural Department of the Gold Coast in experimenting with this machine found that in treating 2,050 lbs. of nuts a saving of 41.5 per cent. in the labour costs was effected, even although 19 per cent. of the nuts escaped cracking and had to be picked out and re-treated.

The "Givira" Machine.

The "Givira" machine for extracting palm oil (Eng. Pat. 3357 of 1909) consists of a horizontal cylinder, plain or perforated, mounted inside a cylindrical case, having a hopper on top: the inner cylinder carries a number of fixed blades and is mounted round a shaft bearing beaters or blades, which disintegrate the fruit pulp. Oil and water is drawn off by means of a cock in the outer case, this case being arranged to turn round the axis of the shaft, for discharging exhausted material. It may also be used as a steam jacket for heating the charge. Trials made in 1912 on the Gold Coast yielded from 14 to 16 per cent. of oil from fruits containing 22 per cent. of oil; the residual pulp, however, contained 36 per cent. of oil and the machine would appear to be not more efficient than the native method. The low extraction is probably due to the fact that the pulp is not pressed. The oil is of good quality and "soft," a sample examined at the Imperial Institute having an acid value of only 10.4.

The "Fanti" Machine.

The "Fanti" machine designed by Mr. Givira of the Gold Coast is designed for small producers; it consists of knives mounted on a shaft, rotated by hand inside a cylinder holding the fruits, the pulp being sliced off and the oil in it extracted by boiling water poured into the cylinder.

It is stated that this machine can produce 25 gallons of oil in 6-8 hours.

The "Palmier" Machine.

The "Palmier" machine consists of a cylindrical press weighing nearly one ton and consisting of seven parts, of which the heaviest weighs slightly over $\frac{1}{4}$ ton; the machine is said to treat 110 lbs. of palm fruit at a time and can be worked by hand or power. In the former case, 1,102 lbs. of fruit can be treated by 4 men in 10 hours yielding 220-242 lbs. of palm oil.

The fruits are first boiled in water for a short time and then pressed in a cylinder surrounded by a steam coil and yield 14-16 per cent. of oil.

The residual pericarp and nuts are removed and treated in a "defribeur" in order to separate the nuts from the fibrous matter. The latter is again pressed and yields a further 8-10 per cent. of oil. The installation costs about £104.

Another machine, patented in England by Phillips of Lagos in 1909, and improved in 1912, consists of a cylindrical vessel, roughened and corrugated on its interior surface and contains a shaft bearing arms. Above the cylinder is a water reservoir with arrangements for regulating the flow of water into the cylinder. The fruits are agitated with water in the cylinder by rotating the shaft. The nuts and fibrous matter are ejected through a hole in the side of the cylinder and the water and oil pass through a filter at the bottom into a tank below.

The machine is said to be similar to the Haake depulper, but extracts the oil in addition to depulping.

The machine in 1914 was advertised as costing £5. Little is known as to its efficiency but it is considered to be useful in economy of time and labour in the preparation of palm oil on a small scale.

Power-Driven Machinery.

A number of machines have been designed for dealing with different operations, *e.g.*, removing the fruit from the bunches, separating the pericarp (depulping machines), cracking the nuts, etc., and also complete machinery for preparing palm oil and palm kernels.

The first operation in manufacture is to remove the fruit, which constitutes about 64 per cent. by weight of the bunches, from the latter.

The native method as described previously is by beating and fermenting.

Two machines have been designed for this purpose—*viz.*, the Hawkins' machine (Eng. Pat. 11618 of 1912) which removes the fruit by placing the bunches, stalk upwards, inside a conical metal basket and subjecting them to the action of a plunger, and thus breaks up the bunch and forces the fruit through the meshes of the basket into a chamber below. The fruits are separated from the fibrous material of the bunch by an oscillating riddle and an air draught and fall through louvres in the bottom of the chamber on to conveyors.

Another machine for a similar purpose has been designed in Germany by Luther. The bunches for this machine have to be cut into three or four parts and fed into the machine.

This machine is said to require one attendant and to deal with about one ton of fruit bunches per hour.

Other types of machinery may be classified as (1) machines in which the whole fruits are pressed without removing the nuts, (2) machines in which the fruit pulp or pericarp is removed from the nut and pressed alone.

A process has even been suggested and patented for grinding up the nuts and pericarp together and producing a mixed palm and palm kernel oil. This is not likely to be viewed favourably.

(1) Machinery for Pressing the whole Fruit.

The earliest French machinery in Dahomey worked on this principle. The fruits, after removal from the bunches, were heated in steam for $\frac{1}{4}$-$\frac{1}{2}$ hour in cylindrical sheet metal tanks with false bottoms and then transferred to presses of about 130 lbs. capacity and pressed by means of a hydraulic piston. Most of the oil was separated by the first pressing and a second heating and pressing of the residue gave more oil, the total yield being 15-20 per cent.

The nuts were then separated from the residual fibre in a rotating drum sieve and dried and cracked in a centrifugal nut-cracking machine. (Poisson's machine.)

The installation consisted of two tanks for heating the fruit, five presses, two drums for separating residual fibre and nuts and one nut-cracking machine; the machinery was run by a 25 H.P. engine, using waste shells and fibre as fuel. One authority quotes 4 tons of fruit per day as the capacity of this plant while another quotes only 2 tons for a similar period.

This plant appears to have been designed and constructed by one or more firms in Marseilles.

In German territory the following process has been described as in use:

The small clusters of fruit, immediately on reaching the central factory, are removed and heated in steam for about 1 hour at 100°C. to prevent the formation of free acid by enzymes (according to Fickendy) or bacterial action.

The heated material is then pounded in a stamping mill devised by Hupfield and constructed by Humboldt & Co. of Cologne. This mill consists of a double-walled trough, heated with steam, in which a row of stamps works on the fruit, *i.e.*, it is similar to a long mortar with a number of pestles worked mechanically.

Rubber buffers prevent the stamps from touching the bottom of the trough. By this stamping the oil cells are broken up, and the nuts remain unbroken, and the mass is said to require only one subsequent pressing. The stamped mass is steam heated and the oil expressed in hydraulic presses as usual. The residue of nuts and fibre, etc. is transferred to a sieve to remove stalks, then to a drum sieve (Luther & Co. of Brunswick) to separate fibre and nuts.

The nuts are sun-dried, cracked in a Haake centrifugal machine and kernels and shells separated by sieves and a brine bath, in which the kernels float and the shells sink.

The total plant, including engine, is stated to cost £3,500 and deals with 8 tons of fruit bunches or 10 tons of separated fruit per 10 hours. Labour and supervision required—European manager, two native fitters and 15-20 workmen.

This process is said to yield about 16 per cent. of oil and 10 per cent. of palm kernels.

The oil, after drying in steam-heated vessels, is said to contain only 5-6 per cent. of free fatty acid and 0.5 per cent. of dirt, etc., and to be suitable for edible purposes.

It is also said to have realized £2 per ton more in Germany than ordinary palm oil.

Another machine of this type is the Hawkins (Eng. Pat. 20061 of 1912) consisting of a circular rotating pan or endless travelling bed containing the fruits, above which is a framework bearing stationary serrated baffles, and pipes for delivering steam or solvents, and heavy rollers for crushing and pressing the fruit in the pan. The baffles are arranged for regulation, in order to disintegrate the pulp thoroughly. The outer wall of the pan is perforated to allow escape of oil into a surrounding channel.

This machine is used in combination with the machine described previously for separating fruit from the bunches. The nuts and fibre by this process are separated by means of an air blast.

Machinery for Removal of Pulp from Nuts before Pressing.

Buchanan and Tyroll (Eng. Pat. 10335 of 1911) have designed a machine consisting of a stationary elongated horizontal cylinder, composed of triangular bars sharpened at the edges and fixed so that they can be set at any suitable angle and to present a new sharp edge when required. The fruits are fed in at one end and acted on by beaters attached to a central shaft, which may be hollow if necessary to allow passage of steam. The pulp passes through the spaces between the bars of the cylinder and the nuts pass out at the end.

The following firms also supply complete plants for the preparation of palm oil, in which the pericarp is first removed from the nuts and then pressed: A. F. Craig & Co., Ltd., Paisley, Scotland; A. Olier et Cie, Argenteuil, France and Louis Labarre, Marseilles.

Craig & Company's plant.—The first-named firm construct a plant known as the Caledonia dry plant which treats the fruit without any boiling or steaming before expressing the oil. It is claimed that by this plant, even if the fruit contains free fatty acids and glycerine, none of the latter is lost.

Depericarping is effected by the Fairfax machine (Eng. Pat. 18050 of 1914) consisting of a table with curved ribs with a cover having ribs in the opposite direction.

The table and cover are rotated in opposite directions and at different speeds. The detached pericarp falls between the ribs and is thrown centrifugally into a cylindrical chamber round the table. This chamber is steam-heated to facilitate movement of the pulp.

The nuts are ejected through holes in the lip of the casing of the machine, while any oil freed from the pericarp passes through a screen and is collected. This machine is said to treat three tons of fruit per hour. The nuts, to which some pericarp may still adhere, are treated in a second machine consisting of two rollers covered with wire brushes, and the nuts are ejected through spaces in the frame of the machine. This latter machine treats 12 cwts. of nuts per hour (*Engineer* 1917, 123, 193).

The dried pulp is cold pressed in hydraulic presses. In the wet season the fruits are first dried in special driers, in which the nuts are also dried, in order to remove more easily the kernels from the shells.

The same firm supplies nut-cracking machinery, combined with an oscillating separator to separate the kernels from the pieces of shell by a dry process.

Olier's machine.—This consists of a number of rotating cylinders carrying metal brushes to remove the pericarp. The nuts and pulp are then boiled in a tilted vat with water and the pulp is carried over the side by the flow of water, leaving the nuts behind. The pulp is collected on linen filters and the water and a little oil passes through. The pulp is heated and the oil removed in cylindrical presses.

The nuts are then cracked (nature of nut-cracking machine not stated) and the kernels separated by means of sieves and a brine tank.

The power required is 25 H.P. for the larger and 12 H.P. for the smaller plant. The pre-war cost of this plant to treat five tons of fruit per day of 10 hours was £1,000 and for a plant to treat 10 tons of fruit £1,500 (exclusive of boiler and engine).

Labarre & Company's machines.—This firm has constructed machinery for several factories in West Africa. Details of the depulping machinery are not available and no mention of nut-cracking machines is made in estimates for complete plant from the makers.

Pre-war costs of this machinery were £1,190 for plant to treat 2.5 tons of fruit per day of 10 hours or £2,090 for a plant to treat 5 tons. The larger plant requires 25-30 H.P.

Nut-Cracking Machinery.

As stated previously, the native method of cracking the nuts between stones is slow and laborious. As in the case of copra, the nut must be dried, in order to remove the whole kernel easily from the shell.

With the exception of the Crellin machine, described subsequently, all of these machines are centrifugal in action, *i.e.*, the nuts are thrown violently from a rapidly rotating drum against a hard surface.

The Miller machine.—This machine consists of a strong cast-iron framework; attached to a spindle rotated by gearing is a vertically mounted drum with two outlets in the rim. The nuts are fed from a hopper into the drum, through a hole at the centre and are thrown through the outlets in the rim against a strong metal rim mounted concentrically at a short distance outside the rim of the drum. The speed of the machine is kept as constant as possible at 40 revolutions per minute, in order to break all the nuts without breaking the kernels.

The makers guarantee that 92 per cent. of the nuts are cracked and practical trials at the Imperial Institute have confirmed this. Both hand and power machines are made, but the former require considerable labour and manipulation for even speed.

The small hand machine can treat about two tons of nuts per day of 10 hours.

A number of these machines are now in use in West Africa; the pre-war cost was £14.

The Crellin machine.—This machine, also sold by Miller Bros. of Liverpool, consists of a pair of smooth tapering steel rollers, mounted side by side in a sloping position above a pair of fluted tapering rollers mounted horizontally. The nuts are fed on the upper pair by a sloping tray kept in motion by means of cams at the ends of the upper rollers. The nuts pass along the upper tapering rollers, till they reach a point where the space is wide enough to allow them to fall through on to the lower fluted rollers, between which they are cracked. The upper rollers are therefore feeding rollers, allowing the nuts to drop at a point where they are cracked without breaking the kernel. Trials at the Imperial Institute show the machine to be somewhat slower than the centrifugal machine. The machine is strong and weighs about 305 lbs.

Several other machines have been invented for dealing with Cohune nuts and are stated to be suitable also, in some cases after modification, for palm nuts.

Separation of Kernels from Broken Shells.

The separation of the kernel from shell, after cracking, may be effected by (*a*) hand picking, which is only suitable where cheap labour is available; (*b*) a brine bath of suitable density in which the kernels float and shells sink; in this case the kernels have to be washed and dried subsequently; (*c*) mechanical means, riddles and rotating sieves; most of these require the brine bath as a supplement owing to irregular size of the kernels and broken shells. A machine patented by Smith (Mather & Platt, Ltd., Eng. Pat. 24249 of 1914) might be mentioned in this connection. The kernels and shell are fed on to a travelling belt passing between revolving cylinders studded with spikes and resilient beds of rubber. The spikes pick up the soft kernels and the hard shells are carried away by the belts.

Note.—A valuable series of articles on British machinery for the manufacture of palm oil and palm kernel oil appeared a short time ago in *Engineering*, but copies of this journal were not available in compiling this report.

Samples of palm oil from locally grown palms and also samples of palm fruit and palm kernel oil are at present being examined at the Agricultural Department and will be reported on in the *Agricultural Bulletin* shortly.

NOTE ON BACTERIAL CHANGES IN LATEX.

By G. Stafford Whitby.

THE purpose of the present note is to indicate the relation of the facts concerning spontaneous change in Hevea latex to the general conclusions on the question of bacterial metabolism which certain recent work has established.

The conclusions to which an extensive series of quantitative researches into bacterial metabolism made by A. I. Kendall and his collaborators [1] led are summed up as follows:

> "A most fundamental principle of bacterial metabolism may be expressed by stating that 'Fermentation takes precedence over putrefaction'; that is to say, bacteria in general which can utilize both carbohydrate and protein, act upon the former in preference to the latter when both are present in the same medium. . . . By fermentation is meant 'the action of micro-organisms upon carbohydrate' and by putrefaction is meant 'the action of micro-organisms upon nitrogenous substances'.
>
> "Whenever bacteria can utilize both carbohydrate and protein for their vegetative activity (for fuel) and both are present in the medium in which these organisms are growing, the carbohydrate is invariably selected in preference to the protein. . . . The products of proteolytic activity, which are only formed when bacteria are utilizing protein for fuel, are alkaline, nitrogenous substances; the products of fermentation, on the contrary, which are formed when bacteria are utilizing carbohydrates for fuel, are non-nitrogenous, acid products."

The researches of Kendall and his co-workers covered a considerable number of different groups of bacteria, and included the *B. coli* group, the Proteus group (including organisms conspicuously associated with putrefying meat), and the Mucosus Capsulatus group (an ill-defined group, including *B. lactis aerogenes* and *B. acidi lactici*).

The organisms were grown in sugar-free broth and in broth containing one per cent. of dextrose or other carbohydrate.

The broth was contained in flasks; and the following statement is made in this connection: "The conditions of the experiment are purposely most favourable to putrefaction; the relatively large, free surface of the culture medium in contact with the air furnishes potentially the oxygen necessary for these organisms, both in sugar and sugar-free media. The results are consequently more significant than would have been the case if the cultures in sugar-containing

[1] *Jour. Biol. Chem.*, 1912, *12*, 13, 19, 215, 219, 465, 469; 1913, *13*, 63; *Jour. Amer. Chem.* Soc., 1913, *35*, 1201.

media were grown anaerobically to force the bacteria to ferment carbohydrate for their oxygen supply." The free ammonia, indicative of attack on protein, and the acidity, indicative of attack on sugar, were determined at intervals. The following results, obtained for a strain of *B. proteus*, are typical.

100 cc. broth contains 242 mgs. total nitrogen. Temperature, 37°

	Days.	Plain Broth.			Dextrose Broth.		
		Free NH_3 as mgs. N per 100 ccs.	Ammonia N / Total N	Reaction. cc. N/1 acid per 100 ccs.	Free NH_3 as mgs. N per 100 ccs.	Ammonia N / Total N	Reaction. cc. N/1 acid per 100 ccs.
			per cent.			per cent.	
Control ...	...	8·40	3·47	0·00	8·40	3·47	0·00
Proteus II ...	1	12·95	5·36	−0·75	10·15	4·20	+2·00
	2	15·05	6·21	−0·75	11·55	4·77	+3·25
	4	59·15	24·50	−2·25	11·55	4·77	+3·50
	6	64·05	26·50	−3·25	10·50	4·34	+3·50
	8	66·50	27.48	−3·00	10·50	4·34	+3·50

The influence of the addition of sugars to latex in preventing putrefaction (originally observed by Eaton and Grantham[1]) and in bringing about an increase in the degree of acidity developed (shown by Gorter and Swart[2]) is seen to be in complete accord with the principles established in Kendall's researches. To this statement the following remarks may be added:

1. It would not appear to be necessary to assume, as is done by Gorter and Swart[2] and by Eaton[3], that the effect of adding sugar to latex is to produce conditions favourable to the growth of certain species of bacteria attacking sugar and forming acid and unfavourable to the growth of *other* species of bacteria leading to putrefaction. The change in the character of the fuel supply available to them would suffice to explain the production *by the same species of bacteria* of putrefaction, with accompanying alkalinity, under one set of circumstances and of fermentation, with accompanying acidity, under another.

2. It seems probable that apart from any anti-coagulating effect which may be ascribed to it on account of the production of alkali which is associated with it, an anti-coagulating effect must be ascribed to putrefactive activity in latex on other grounds. The reasons for making this statement are as follows:

(*a*) Latex left to undergo natural change under conditions such that putrefactive activity takes place in it, *i.e.*, latex allowed to stand, without any addition of sugar, in the air, never becomes completely

[1] This Bulletin, 1915, *IV*, 26.

[2] See this Bulletin, 1916, *V*, 48.

[3] *Ibid.*, 1917, *VI*, 158.

coagulated, even though the percentage of acid developed in it may be greatly in excess of that which it would be necessary to add to fresh latex, in which no putrefactive change had occurred, in order to bring about complete coagulation[1].

(*b*) The writer has found, and doubtless others have made a similar observation, that there is a marked tendency for the milky fluid obtained from latex (particularly from diluted latex) which has been allowed to undergo natural change in the air and in which coagulation is incomplete, to behave abnormally towards acetic acid: it is, *e.g.*, not coagulable by added acid with the same ease that diluted fresh latex of similar rubber-content is coagulable.

Thus, it seems clear that proteolytic activity in latex has an anti-coagulating influence other than and beyond any due to the neutralisation of acid by the alkali produced by it. At present the reason for this can only be a matter for surmise. It is possible that one or more of the products of proteolysis has a paralysing effect on the hypothetical coagulating enzyme of latex. Or, it is possible that proteolysis tends to break up a reticular framework of protein upon which the formation of a coherent coagulum may depend or has the effect of greatly reducing the size of the caoutchouc particles and in this way of making difficult the separation of the caoutchouc in a coherent form. It is to be noted that a marked tendency may be encountered for the rubber present in the milky serum obtained from latex in which putrefactive change has taken place to separate, at all events initially, as a "cream."

It may be remarked that in the work of Kendall already referred to an exceptional and interesting case was provided by *Streptococcus pyogenes* and other coccal organisms examined. These produced some acid even in sugar-free broth. This is ascribable, the authors believe, to fermentation of the carbohydrate radical of the protein molecule by these organisms. Acid production increased to the sixth day, but on the eighth day the medium was strongly alkaline. It was assumed that the sudden change in reaction was due to exhaustion of the carbohydrate radical.

In the case of latex it is not perhaps necessary to assume that any of the acid produced in normal spontaneous change is derived from protein, since latex contains carbohydrate. It may be remarked, however, that, to judge from available data, it is not quite certain that the amount of fermentable carbohydrate in latex is sufficient to account for the degree of acidity which may under certain circumstances develop in latex as a result of natural change. On the one hand: Beadle and Stevens[2] record analytical figures for three samples of latex. The largest proportion of sugar present in any of the samples was ·19 per cent. "Sugars after inversion" in a sample of latex containing 22 per cent. total solids *i.e.*, "sugars after inversion"=·86 per cent. of the total solids. Now it is probable that only a portion of the sugar would be converted into acid. van Slyke and Hart[3], in an investigation into the development of acid in cow's milk, found about 62 per cent. to be the maximum quantity of acid derived from the milk sugar which disappeared. Thus the

[1] See Whitby, 8th Internat. Congress Appd. Chem., 1912, *25*, 597.

[2] 8th. Internat. Congress Appd. Chem., 1912, *9*, 40.

[3] *Amer. Chem. Jour.*, 1904, *32*, 145.

maximum amount of acid (expressed in terms of lactic acid) to be expected from the sugar in Beadle and Stevens' highest sample might not unreasonably be put at ·53 per cent. (calculated on the total solids).

On the other hand, the author found[1] that a sample of latex (sugar content unknown) developed, in 24 hours, after dilution, natural acidity equivalent to ·30 per cent. acetic acid (equivalent to ·45 per cent. lactic acid) calculated on the volume of the undiluted latex. Unfortunately there is no record of the rubber-content of this sample of latex, but if we put the percentage of total solids as high as 44, we find that the acidity developed, was in terms of lactic acid, 1.02 per cent. calculated on the total solids—a figure almost twice as large as that derived above from Beadle and Stevens analytical records.

[1] *Loc. cit.*

REPORT ON COCONUT PRODUCTS IN THE PHILIPPINES.

By W. S. Cookson,
(General Manager, Selama-Dindings Plantations, Ltd.).

Coconuts.

THE total number of coconut trees in the Philippines at the end of 1914 was estimated by Jacobson, B. S., at 45,000,000, equal to about 750,000 acres, of which nearly all were in bearing at that date.

A definite census has been attempted this year (1918), the returns of which show a lower figure than Jacobson's estimate. The total number of trees shown under this census is about 31,000,000, and the crop from them for the last fiscal year (1917-18) comes to about 892,000,000 nuts, or an average production of about 29 nuts per tree per year.

Considerable variation is shown in the rate of yield. The highest yielding district is Zamboanga, with an average of 45 nuts per tree. Cebu shows 22 nuts. Five other districts show the following figures: 19½, 19, 13, 9, 8 nuts per tree per year. Two districts show an average of only 6 nuts per tree per year.

Most of the planted areas are in Luzon, the balance being chiefly in Mindanao, Cebu, and in Leyte.

No coconuts are grown near enough to Manila to make possible the transport of nuts to the oil mills, which are all in Manila, excepting one at Cebu and one newly erected in the San Pablo coconut district. All oil is made from copra. The oil mills do not own any coconut plantations, but buy copra in the open market.

Copra.

The bulk of Philippine copra is native dried, chiefly over crude smoke kilns. It is inferior to Malabar or Cochin copra and is in fact of only average marketable grade and has no special qualities to distinguish it from other copras of similar grade produced in other parts of the world.

Copra and Oil.

The output of copra has grown steadily since 1899 when it was 14,000 metric tons. In 1912 it was over 169,000 tons. Up to 1912 no oil had been produced except on a small scale by antiquated processes. About 50,000,000 nuts were made into oil in 1913, and some 4,600 tons of oil were produced of which only 1,300 tons were exported. In 1912 and 1913 modern oil mills were established and the production of coconut oil has increased to 16,000 tons for 1916,

and 49,800 tons for the fiscal year ending 1917. In 1916, 72,000 tons of copra were exported. Figures of copra export for 1917 are not available in tons, but it is known that copra to the value of £1,388,418 was exported in the fiscal year ending June, 1917, and to the value of £1,905,448 for the year ending June, 1918. It is expected that a shortage of copra will be experienced after 1918.

Previous to 1915 coconut oil was produced in very few factories and chiefly in the P. V. O. of Manila and the Visayan mills of Cebu. There were also a few small oil mills with modern machinery and also a certain amount of oil produced in the native villages by the ordinary native hot water extraction process.

To-day there are in Manila alone twelve factories, and the value of coconut oil exported in the first quarter of 1918 was £1,610,000. The coconut oil mills are making large profits and new mills are going up rapidly.

The types of machinery chiefly in use are the hydraulic press and the Anderson Oil Expeller. It is estimated by the Bureau of Science that there are already over one hundred Anderson Expellers at work in the Philippines and that when the additional expellers now on order shall have arrived, the total number will be 164. An estimate by a commercial firm places the present number in operation at between 60 and 70 with prospects that over 100 will be working by the end of the current year. One firm uses 24 Anderson Expellers, another 16, another 7, another 5 and another is now installing 5 and proposes to install another 5 by the end of the current year, and there are several native owned plants with 2-6 machines. In some cases, expellers only are used, but other factories are said to use expellers for the first extraction and to extract the residue with hydraulic presses. One factory is said to recover the oil from the expeller residue by means of a chemical extraction process in which carbon tetrachloride is used as a solvent.

At the present time, more Anderson Expellers are being imported into the Philippines than any other type of oil machinery. Various explanations may be given for this fact, but it would appear that the chief reasons for the popularity of the expeller consist in its simplicity, cheapness, the ease with which it may be installed and operated and perhaps more especially, in the greater chances of obtaining delivery and shipping space for this compact machine as compared with the heavier units of the hydraulic type of oil plant, and in the fact that numbers of second hand expellers have been obtainable from the cotton seed oil districts of America.

Mechanically the expeller is less satisfactory than the hydraulic press in that it has more wearing parts, of which one at least (the central worm) has fairly frequently to be repaired or replaced. With the hydraulic press delays due to mechanical troubles are very infrequent. Considered as an expression plant, the expeller is less efficient than the hydraulic press. The output of the expeller will vary with the percentage of expression obtained. This percentage is controlled by an adjustable hand-screw at the end of the machine. If the expeller is set to obtain an equal percentage of extraction with the hydraulic press, the output is cut down to an unprofitable point. A reasonable balance between output and percentage has been found

at a point where the output is about five tons of expressed oil per 24 hours which with a properly working machine will give an extraction of 48-52 per cent. on copra containing average oil content of 60 per cent. A properly installed and operated hydraulic press of the latest Anglo-American or similar type will produce about eight tons of oil in 24 hours with an average extraction of 55 per cent. compared to the expeller's 48-52. As regards prime cost and installation expenses the advantages are with the expeller. An expeller plant can be put up in smaller units than a hydraulic press and with less auxiliary machinery. An installation of expellers can be extended indefinitely unit by unit and the units can be worked in batteries with considerable convenience and economy in attention and power transmission.

The expeller requires in the way of auxiliary machinery only a coarse disintegrator of almost any type and suitable conveyors, filter-press, piping, oil pump, settling and storage tanks. With the hydraulic press the meal to be expressed must be much more finely divided, and high efficiency cannot be obtained unless the disintegration is carried almost to the point of rupturing the individual cells. This extremely fine state of division is usually obtained by using a combination of disintegrators, shredders and grinders, with a final grinding either with edge runners or by passing through the high roll machine.

Transport of Oil and Copra.

Tank transport at g. $60 per ton to San Francisco is the most desirable because, although barrel transport is fairly cheap at g. $45 per ton to San Francisco as deckload, it is uninsurable in that position and is burdened with the cost of transport of barrels, which are imported in knock-down form and set up in Manila by a factory especially designed for the purpose. For copra, transport charges from Manila to San Francisco have been g. $80 per ton, in bags or cases, and shipments in bulk are not accepted. These rates are against pre-war rates of g. $5-8 per ton shipped chiefly in bulk. The United States Government has recently caused the rate on copra to be reduced to about g. $50.

There is considerable optimism for the future, of coconut growing in the Philippines. The price of copra is now low in proportion to the price of oil owing to the preference for oil as cargo and the lack of oil expressing facilities hitherto. Copra has been selling at practically pre-war prices—P. 10.50-11.50 per pikul, while coconut oil brought $11\frac{3}{4}$ cts. g. per lb. locally and $15\frac{3}{4}$ cts. g. f. o. b. San Francisco. To-day's price at New York is $17\frac{3}{4}$ cts. g. per lb. It is generally expected that the situation will gradually right itself when shipping space increases and oil mills become more numerous until the margin between the copra market and oil barely covers the cost of manufacture. It is not improbable in fact that there will arise a period of competition among oil mills for copra supplies which, being limited, are apparently destined to get short and in consequence the price of copra during that period may be relatively higher than that of oil. It is expected that an immediate fairly heavy fall in the American price of coconut oil will follow the cessation of war, through the feeling of security of future supplies as ocean tonnage increases.

The present high price of coconut oil will probably decline, but lower freight rates will possibly largely compensate. The general opinion in the Philippines is that the future of the coconut oil business is promising with the expectation that the eventual volume of business will be limited only by available supplies of copra.

Coconut oil bringing $15\frac{3}{4}$ cts. g. per lb. f. o. b. San Francisco, is on a standard of 5 per cent. free fatty acid calculated as oleic. One company produce a guaranteed 3 per cent. acid oil for which they obtain a premium over the regular market price. Oils containing more than 5 per cent. free fatty acid are subject to discount in proportion to the extra amount of free fatty acid. It is stated that a Cebu factory produces ·18 per cent. free fatty coconut oil by refining and that a premium of 2-3 cts. g. is given for low acid content.

THE FORMATION AND UPKEEP OF HEDGES.

By J. N. Milsum.

THOUGH there are a number of plants suitable for hedges in Malaya, they are but very imperfectly known to the average European resident. During the past few years the Department of Agriculture, Federated Malay States, has introduced seed of a number of hedge-plants that are commonly planted in the West Indies and other tropical countries. Several of these introductions promise to be of considerable value and the following notes are written with a view to making these and other hedge-plants better known.

The advantages of a good hedge system surrounding a property are many. On the estate and small-holding, neat hedges not only add to the appearance of the place, but serve as a guard against the depredations of stock and human trespassers. Where shelter is required for raising delicate plants, a judiciously placed hedge forms an efficient wind-break. The cost of planting and upkeep of hedges is necessarily a consideration and it is obviously impracticable to hedge the boundary lines of large estates. Road frontages and various internal situations around the estate buildings frequently require to be hedged. In the compound and ornamental garden, hedges are very desirable. Unsightly buildings and the servants quarters should be screened from view of the bungalow and pleasure garden. A neatly trimmed hedge makes an effective background for a border of annuals or low-growing flowering shrubs.

The Formation of Hedges.

The habit of the plant selected to form the proposed hedge will need consideration before planting operations are commenced. If trees, such as the casuarina (*Casuarina equisetifolia*) or annatto (*Bixa Orellana*), are to be planted to form a screen, large holes at suitable distances apart, are all that is required. A deep trench, filled with a compost of well-pulverized soil, rotten cow-manure and any other available humus matter, is a necessary preliminary requirement before planting the hedge. It is most important that the land be deeply trenched. The mistake is frequently made in planting a hedge, of doing the initial work in a slovenly and haphazard fashion; this results in a slow-growing and uneven barrier. Numerous instances have convinced the writer that deep digging is essential to obtain continuous success with hedges; the same remark applies in planting all ornamental trees and shrubs in Malaya. Naturally some situations are more favourable to the growth of plants than others, but on heavy clays, laterite and other poor soils, the best results are obtained by deep and thorough stirring of the subsoil.

Though in the majority of cases, the addition of cow-manure in the trenches is to be recommended, caution must be observed with regard to white-ants. These insects are frequently attracted by the decaying manure and sometimes become a danger to the newly-planted hedge.

The size of the trench will vary according to the type of plants employed. A minimum depth of 2 feet and width of $1\frac{1}{2}$ feet is, however, essential. It is usually necessary to supervise personally the native engaged in this work, to see that the soil is actually removed from the trench.

In planting the hedge two methods may be adopted; either unrooted cuttings can be employed, or rooted plants, previously propagated in the nursery, may be lifted and planted. The latter method gives the quickest result and is generally the most satisfactory, but good hedges are often obtained from unrooted cuttings and this method is commonly adopted on account of the great saving of labour. Some plants root more readily than others and if the cuttings are taken during the wet weather, entirely satisfactory results may be obtained.

It is most important during the early stages of growth to see that no domestic animals are allowed near the hedge; certain plants are more liable to attack than others, but most cattle will eat sprouting cuttings. When the cuttings have reached a height of 1 foot or so, they should be gone over with a sharp knife and cut back several inches to form lateral growths. Unless this operation is done early the base of the hedge will always be thin and of little service as an effective barrier. As the hedge grows periodical pruning will be necessary, especially so during the rainy season.

Upkeep.

To maintain a hedge in good condition, it needs careful clipping and freedom from weeds and climbers. Shears are the most satisfactory implements for trimming hedges, but a serviceable tool can be made by cutting down an old scythe-blade and attaching a wooden handle. Hedges have a tendency to become bare and leafless near the ground and this should be remembered when trimming. The top of the hedge may be severely trimmed as often as necessary, but basal growth should be conserved as far as possible. The frequency of trimming varies according to the kind of plant employed. The common hedge-bamboo requires a lot of attention, especially during rainy weather, as the new canes tower above the top of the surrounding growth making the hedge look very unsightly. The height of the hedge will be governed by circumstances, but a suitable allowance for a compound hedge is 6 feet.

It is not uncommon to see a good hedge marred by the presence of lalang, climbers and other noxious weeds. These should never be allowed to become out of hand. Lalang must be dug out with its roots immediately it is observed. Other low-growing weeds are less harmful, but should be periodically removed. The purple-flowered *Ipomoea* is often troublesome and once established in a hedge is often difficult to eradicate.

The root action of hedges, causing the loss of soil moisture in the land on either side of the hedge, is often advanced as an objection to the use of hedges in a garden of limited area. Certain plants are much worse offenders in this respect than others. The difficulty can usually be surmounted by digging a trench between the hedge and the land that it is desired to protect. It is unnecessary to do this until the hedge has become established, when the trenching operation will be beneficial to the roots of the hedge.

Plants Suitable as Screens.

The most useful plant for this purpose, in the writer's opinion, is the annatto (*Bixa Orellana*). It is a small tree or shrub, with dark green foliage and pink flowers followed by numerous deep-red capsules, which when ripe give the tree a very striking appearance. The orange-red arillus which surrounds the seeds, forms the annatto of commerce. The annatto is not indigenous, but is frequently met with in Malaya, especially in the towns. It is raised from seed or cuttings, but is of such rapid growth that very satisfactory results may be obtained by simply sowing the seed in deeply-dug holes, spaced about 12 feet apart. In two years from sowing, a screen 15 to 20 feet high can thus be obtained. Seeds may often be collected throughout the year, but are procurable in the greatest quantity in October and November.

Other plants for screens are the common bamboo, casuarina, Indian coral tree or dadap (*Erythrina indica*) and the narrow-leaved *Allamanda nerifolia*. The bamboo has the disadvantage of often growing too large and becoming out of control, forming a harbour for mosquitoes and other insects. The Ceylon iron wood tree (*Mesua ferrea*), though not often planted in this country, is a suitable tree where a very dense and impenetrable barrier is required. The seed should be sown thinly in a well-prepared trench, plenty of room being allowed between it and the building it is desired to screen. Such a barrier, properly cared for, will form almost as good a hedge as a yew-hedge in Europe. Seed is not procurable in this country, but is offered by seed merchants in India and Ceylon. The Ceylon iron wood does not transplant well and unless grown in pots or baskets, should be sown direct in the position it is required to fill. Several of the robust varieties of hibiscus may be employed as screens with partial success, but are frequently unsatisfactory on account of disease attacking the stems, resulting in a proportion of the hedge dying out and causing gaps. The hibiscus is propagated from cuttings, either rooted under shade or placed direct in the trench.

There are several strong-growing grasses that may be used as screens. *Saccharium arundinaceum* attains a height of about 15 feet and makes a very imposing screen. It is also useful for planting on steep banks as a prevention against wash. *Andropogon pertusus*, a grass recently obtained by the Department of Agriculture from Australia, promises to be of value as a screen-plant. It is readily raised from cuttings and is of very rapid growth.

Boundary Hedges.

In considering suitable plants for this purpose, it is convenient to divide the group into two divisions—

(1) Suitable subjects for effecting a boundary or barrier for a small-holding or other cultivated land.

(2) Plants to form a boundary hedge in the compound.

It is a common practice with natives in Malaya to plant tall-growing palms or other trees as boundaries. With the addition of several low-growing trees or shrubs and a strand of barbed-wire passed through the middle, this arrangement makes a fairly serviceable hedge. The trees most frequently used for this purpose are the betel nut palm (*Areca catechu*) and the silk cotton tree or kapok

(*Eriodendron anfractuosam*). The trees or shrubs to form the base of the hedge are usually one or more of the following; *Euphorbia Tirucalli,* called in India the milk hedge, the dadap (*Erythrina indica*), the common guava (*Psidium gujava*), and various other native fruit trees.

Without a doubt the most effective barrier is obtained by planting thickly the common dwarf bamboo and allowing it to grow to its maximum height. When properly established such a hedge is almost impenetrable and needs hardly any attention. Other suitable trees, but used to a less extent, are the Madras thorn (*Pithecolobium dulce*), called in the Tamil language "korukapili" and *Pithecolobium Unguis-cati.* The West Indian logwood (*Haematoxylon campechianum*), seed of which was introduced from the West Indies by the Department of Agriculture in 1916, has shown some promise as being a suitable tree for the purpose under consideration. Its growth, however, has been rather slow and it requires further observation to determine its value as a hedge plant in this country.

Several species of Agaves form useful boundary hedges These plants are propagated from suckers and form a fine hedge for a time until they commence to flower, when the plants die down and require to be replanted. The green aloe or Mauritius hemp (*Furcræa gigantea*) if planted thickly, forms a very formidable barrier.

(2) The most satisfactory hedge for the compound is the common bamboo. Its one objection is that unless constantly kept cut it is of very unsightly appearance. With careful attention to clipping a thick, neat, hedge can be maintained for many years. Several other plants, though not generally used, have been employed as hedges on the Experimental Plantations with considerable success. The coffee-bush (*Clerodendron aculeatum*), introduced from the West Indies in 1916, has proved a valuable hedge plant. It is quick growing, somewhat thorny, and readily raised from cuttings, which may be placed in the ground where it is desired to have the hedge. With careful training the coffee-bush keeps a splendid shape and it would appear to be a suitable bush for topiary work in the tropics. The limeberry (*Triphasia aurantiola*) is used as a hedge in some countries, but is of rather slow growth in Malaya. It is thorny and forms an almost impenetrable hedge when established. *Thunbergia erecta* and its white-flowered variety are excellent plants for hedges where ornamental effect is also desired. The former has lovely blue flowers which are produced in great profusion throughout the year. It is easily raised from cuttings and forms a good hedge of any height up to 8 feet, but it is most useful as a low hedge on account of its habit of retaining its lower foliage. The common gardenia (*Gardenia florida,*) may be trained into a very useful hedge, though with age it loses its lower branches and becomes useless as a barrier to keep out poultry and small animals. Reference has already been made to the hibiscus, though these plants are sometimes satisfactory, they cannot be recommended for general use on account of the possibility of their dying out from disease.

Ornamental Hedges.

The surroundings of a motor-drive or path to the bungalow can be made very attractive by planting a suitable ornamental hedge. Possibly the best plant for this purpose is the purple-flowering

bignonia (*Bignonia magnifica*). When grown in the open this plant forms a low rambling bush about 6 to 8 feet high, but should there be any trees or other support near at hand, it will climb into the topmost branches, forming hanging festoons of purple flowers nearly every month of the year. The bignonia is propagated from cuttings or layers, the latter method giving the best results. It requires good soil to do really well and deep and thorough trenching is repaid by luxurious growth and a profusion of bloom almost throughout the year. The common magenta-flowered bougainvillaea is also a suitable plant with a similar habit, but sometimes becomes unsightly unless given attention with regard to pruning. The several species of allamanda, with large yellow flowers, may also be used; these plants require to be cut hard back periodically, otherwise they are inclined to get out of order. *Congea tomentosa* makes a fine display when once established, but should be grown in soil that has been well-worked and enriched by the addition of humus matter. Its beautiful pink bracts last for a considerable time and are useful for table decoration.

Crotons are good plants for an ornamental hedge where a formal effect is desired. They are more satisfactory in some situations than others and should not be planted where the land is poor or liable to become very dry. *Acalypha macrophylla*, with its dark red foliage, forms a good low hedge and provides a pleasing contrast to the greenness of gardens in Malaya.

There are several plants for use as low hedges for bordering paths. *Clerodendron Thomsonae*, with crimson and white flowers, forms a good border a foot or two high, but needs renewing after the second year. *Thunbergia erecta* var. *alba* is also a suitable subject and may be kept very low by continual clipping. It is not generally known that the casuarina can be used as a low hedge; by careful pruning during the early stages of growth it may be trained into almost any shape.

CRUDE RUBBER AND COMPOUNDING INGREDIENTS.

By Henry C. Pearson.

India Rubber Publishing Co. New York; 1918, pp. 398 and Index.

THE third edition of this useful compendium on crude rubber from all sources and the numerous compounding ingredients of all kinds used in its manufacture, together with a resumé of methods of manufacture of different articles has been received recently.

The author, Mr. Henry C. Pearson, who has travelled extensively in the East and in the Amazon and other rubber-producing countries is the editor of that excellent American publication *The India Rubber World* and author of other books dealing with different aspects of the rubber industry and has had a wide experience in different fields of the industry.

Since the appearance of the first edition nearly twenty years ago, important advances have been made in the rubber industry, the most important of which has been the introduction and development of the plantation rubber industry and the enormous development in the consumption of rubber, especially for tyres of all kinds. Quite important advances too have been made in connection with various aspects of the manufacturing side of the industry, chief among which has been the discovery and use of artificial vulcanisation accelerators and also the discovery of natural accelerators in raw rubber which have been found to be responsible for the lack of uniformity in the plantation product.

This edition follows the lines of the former editions and in addition has interesting chapters on synthetic rubber, vulcanisation without sulphur, a problem which has interested chemists since the remarkable effect of sulphur on rubber after heating was first discovered, but which has not so far led to the discovery of any important alternative method of vulcanisation for commercial purposes.

A chapter on vulcanised rubber, which has become, especially in America, an industry of considerable size and importance is also included and a useful chapter on the analysis and testing of raw rubber, which includes the methods adopted by the Bureau of Standards, U. S. A.

The chapters dealing with primary processes, divisions of rubber manufacture and typical compounds should prove of interest to those who are not acquainted with the numerous ingredients which compose many manufactured rubber articles and of guidance to those who desire for experimental or other purposes to manufacture any of the articles mentioned.

In the section on synthetic rubber, the author states, what is known to those directly interested on the subject but often not realised by the "layman," that synthetic rubber has been attained as a triumph of chemical science and its production has been a great contribution to our knowledge, but not even the stimulus of war has

enabled even Germany, which lacks the valuable raw product, to make synthetic rubber an industrial success. A warning is also issued in connection with the prominence given in newspapers periodically during the last few years to synthetic rubber discovery and discoverers and the fraudulent substances which have been advertised as being the successful synthetic product.

A very large proportion of the book is taken up with a description of the properties and methods of manufacture of the numerous ingredients and "substitutes" used in rubber manufacture. These descriptions are of value to those unacquainted with many of the compounds or for works foremen who may have little or no knowledge of chemistry and chemicals.

There is also a useful chapter on plantation rubber and its variability in cure, which contains a good summary of the earlier researches carried out at the Agricultural Department, F.M.S.

The new edition of this book can be recommended to producers of the raw product, *i.e.*, planters, and to rubber chemists and others interested in the production of the raw material and the many classes of manufactured rubber goods.

B.J.E.

MINUTES OF MEETING OF THE PLANTERS' ASSOCIATION OF MALAYA,

held at 12, Market Street, Kuala Lumpur, on 28th August, 1918, at 10.30 a.m.

PRESENT:

The Honourable Mr. R. C. M. Kindersley (*in the Chair*)

and the following DELEGATES:

From Batang Padang D.P.A.	...	Mr. T. H. B. Phillips
„ Batu Tiga D.P.A.	...	Messrs. W. S. Reeve-Tucker and T. J. Cumming
„ Central Pahang P.A.		Mr. P. J. A. Williams
„ Central Perak P.A.	...	Messrs. G. Gordon-Brown, J. S. Ferguson and W. R. Shelton-Agar
„ Johore P.A.	„	W. Miller Mackay, C. Bradbery and C. W. Bradburne
„ Kajang D.P.A.	„	A. C. Hayton and G. L. O'Hara Hickson
„ Kapar „	„	W. J. S. Price, W. P. Okeden and L. Mooijaart
„ Klang „	„	H. R. Quartley, Chris. Harrison and R. Napier Hendrie
„ Kuala Langat D.P.A. ...	„	G. C. Ash and G. Fenningworth
„ Kuala Lumpur „ ...	„	H. Armstrong, F. Clyde Jeavons, F. G. Harvey and Col. A. J. Fox
„ Kuala Selangor D.P.A. ...	„	Thos. H. Menzies, H. C. Mustard and H. B. Dudley
„ Lower Perak P.A. ...	„	W. H. Vaughan Smith, R. H. Dodgson and W. R. C. Gray
„ Malay Pen. Agl. Assn. ...	„	J. W. Kennedy, M. Strivens and A. Craigen
„ Negri Sembilan P.A. ...	„	C. Ritchie, J. D. McCulloch, G. W. Hingston, R. Gooch, Geo. Grant and A. Waterfield
„ Taiping P.A.	„	Geo. Low and W. S. Cookson
„ Ulu Selangor D.P.A. ...	„	W. de L. Brooke and N. H. Dakeyne

HONORARY MEMBERS.—Mr. L. Lewton-Brain (Director of Agriculture, F.M.S.) and Mr. J. R. O. Aldworth (Controller of Labour, F.M.S.).

VISITORS.—Messrs. G. C. Bailey, R. Matthews, V. Sauchelli, G. E. Perry, T. Watson, S. Wierman, H. Emerson, Carlyle Bell, A. M. Monkland, H. W. F. King, J. Firth Fletcher, T. Donaldson, E. R. Barnet, G. E. Coombs, B. J. Eaton, Dr. E. J. Butler (Imperial Mycologist), and Dr. Malcolm Watson.

SECRETARY.—Mr. H. C. E. Zacharias.

In the temporary absence of Mr. Kindersley, Mr. Harvey is voted to the Chair.

1.—MINUTES.

The minutes of the meeting held on the 26th of June are confirmed and signed subject to the insertion on page 14 of Mr. McCulloch's motion.

2.—WAR RELIEF.

The SECRETARY reports the receipt of the following subscriptions to date:

PLANTERS' WAR RELIEF FUND OF MALAYA.

Subscriptions received up to 27th August, 1918.

	$ c.	$ c.
BATANG PADANG, D.P.A.	520.00	
Davidson, R. ...	30.00	
		550.00
BATU TIGA, D.P.A.	140.00	
Balloch, R. B. ...	20.00	
Bell, C.	100.00	
Bennett, G. H. ...	100.00	
Bragg, W. H. ...	80.00	
Chalmers, A. P. ...	60.00	
Crush, C. N. ...	40.00	
Cumming, T. J. ...	100.00	
Davidson, A. ...	40.00	
Davidson, D. C. K....	100.00	
Finkleston, G. ...	10.00	
Gilman, M. A. P. ...	40.00	
McNeill, F.	40.00	
Ord, J. G.	40.00	
Orr, H. Douglas ...	60.00	
O'Malley, F. B. ...	40.00	
Robertson, J. A. ...	40.00	
Sansom, P. N. ...	45.00	
Spooner, A. F. ...	60.00	
Tucker, W. S. Reeve-	40.00	
Webb, C. M. ...	20.00	
Will, R. W.	32.00	
Williamson, J. ...	40.00	
		1,287.00
CENTRAL PAHANG, P.A.		
Birkemose, F. ...	100.00	
McVitie, D. D. ...	75.00	
Sungei Bilut Estate	40.00	
Williams, P. J. A. ...	97.20	
Willis, E. J. ...	60.00	
		372.20
Carried forward ...		2,209.20

	$ c.	$ c.
Brought forward		2,209.20
CENTRAL PERAK, P.A.	1,138.00	
Caldwell, W. J. ...	60.00	
Jonklaas, W. O. ...	80.00	
Robins, N.	20.00	
Wilson, T. K. ...	60.00	
		1,358.00
JOHORE, P.A.		
Adamson, H. ...	10.00	
Anker, E.	30.00	
Batu Anam (Johore) Club	320.00	
Becker, F. E. ...	30.00	
Bell, C. E.	40.00	
Bolton, G. V. ...	162.00	
Bradbery, C. ...	100.00	
Bradburne, C. W. ...	100.00	
Cummins, H. ...	30.25	
Creighton, R. G. ...	40.00	
Dawson, G.	10.00	
Gawler, W. N. ...	50.00	
Gilfillan, W..., ...	12.00	
Innes, A.	10.00	
Jessen, G.	87.00	
Kluang Estate ...	30.00	
Lanadron Staff ...	100.00	
Le Doux, J. S. ...	25.00	
Monson, J. H. ...	50.00	
Nordanal Staff ...	100.00	
Muar River Estate Staff	135.00	
Permas River Estate Staff	52.00	
Ramsay, H. H. ...	30.00	
Robertson, A. W. ...	50.00	
Carried forward ...		3,567.20

	$ c.	$ c.
Brought forward		3,567.20
JOHORE, P.A. —(*cont.*)		
Ross, D. A.	119.95	
Segamat Estate Staff	70.00	
Smith, St. Alban ...	50.00	
Spencer, E. S. ...	100.00	
Sungei Dangar Estate Staff ...	13.00	
Tebrau Estate Staff	292.50	
Tinker, A.	50.00	
		2,298.70
KAJANG.	210.00	
Beaty, C.	40.00	
Biggin, B.	30.00	
Clerk, G. P.	80.00	
Cummins, E. N. T. ...	100.00	
Dakeyne, O. P. ...	100.00	
Ferrers, C. R. ...	80.00	
Fowler, H. O. ...	53.50	
Kinder, C.	50.00	
Kindersley, R. C. M.	100.00	
Mactaggart, R. K. ...	28.00	
Mesney, R. F. ...	60.00	
Miller, C. H. ...	10.00	
Moullin, H. R. ...	100.00	
Paul, C.	20.00	
Pinhorn, P. R. ...	30.00	
Schwabe, E. M. ...	80.00	
Solbe, H. E. G. ...	200.00	
Sparshott, H. C. ...	30.00	
Tyler, E. W.... ...	60.00	
Wiggins, T. G. ...	10.00	
		1,471.50
KAPAR.		
Armstrong, F. E. J.	40.00	
Fisher, N.	120.00	
Gray, F. E. A. ...	40.00	
Mooijaart, L. ...	80.00	
O'Brien, W. L. R. ...	100.00	
Pratt, J. C.	36.00	
Stonehewer, E. S. ...	68.00	
Tedlie, T. H. ...	40.00	
		524.00
KELANTAN.		
Anderson, W. G. ...	100.00	
Archer, L. D. ...	60.00	
Taylor, A. N. ...	40.00	
		200.00
Carried forward ...		8,061.40

	$ c.	$ c.
Brought forward		8,061.40
KLANG, D.P.A.	280.00	
Battiscombe, R. B. ...	40.00	
Biddlecombe, H. T. A.	48.00	
Buxton, C. A. ...	80.00	
Greenhill, R. D. ...	100.00	
Gulland, D. L. ...	40.00	
Latimer, T. M. ...	30.00	
Maguire, C.	30.00	
Napier Hendrie, R....	60.00	
Prior, E. B.	60.00	
Quartley, H. R. ...	300.00	
Roberts, C. L. ...	40.00	
Midlands Estate ...	24.00	
Smith, C. Hammond	100.00	
Trollope, F. A. ...	60.00	
Wakefield, E. C. ...	80.00	
		1,372.00
KUALA LANGAT.		
Hardingham, J. P. ...	50.00	
Irvine, H. C. d'Arcy...	60.00	
Lendrum, J. B. ...	60.00	
Mann, J. P.	40.00	
Munro, R. W. ...	80.00	
		290.00
KUALA LUMPUR.	278.84	
Armstrong, H. ...	100.00	
Barnet, G. P. ...	100.00	
Campbell, F. M. ...	100.00	
Coppens, P.	50.00	
Castlefield Estate ...	147.00	
Douglas, J. B. ...	83.25	
Farrell, M.	40.00	
Fraser, W. D. ...	100.00	
Harvey, F. G. ...	80.00	
Harvey, T. R. ...	40.00	
Jeavons, F. C. ...	100.00	
Laddell, R. G. ...	80.00	
Luschwitz, T. H. ...	40.00	
McCrow, D. W. ...	40.00	
Quaife, Dr. W. T. ...	25.00	
Smith, M. Sharpe ...	102.84	
Wilkinson, H. B. ...	80.00	
Zacharias, H. C. E....	60.00	
		1,646.93
KUALA SELANGOR.		
Brown, T. L. ...	40.00	
Estrange, G. R. L. ...	80.00	
Fesq, E. W.	100.00	
Carried forward ...		11,370.33

	$ c.	$ c.
Brought forward		11,370.33
KUALA SELANGOR —(*cont.*)		
Gordon, W. M. ...	68.00	
Irving, L. A. ...	120.00	
More, Thomas ...	100.00	
Ransom, R. H. ...	25.00	
Quinton, L. M. ...	30.00	
Stevens, T. L. ...	80.00	
E. D. M. K. K. ...	160.00	
		803.00
LOWER PERAK.		
Bayley, H.	60.00	
Bayley, R. G. ...	112.00	
Brodie, T.	80.00	
Bryant, G. W. ...	218.05	
Cruickshank, E. J. ...	10.00	
Dodgson, R. H. ...	40.00	
Dukes, M. B.	40.00	
Hartley, M. R. ...	20.00	
Evans, R. C.... ...	40.00	
McLeod, R. A. ...	60.00	
Park, H. H.	39.00	
Sabrang Estate Staff	163.00	
Selaba „ „	110.00	
Symes, A. B. ...	75.00	
Phillips, R. H. ...	40.00	
Tobutt, K.	40.00	
Ratanui Estate Staff	102.42	
		1,249.47
M. P. A. A.		
Alor Pongsu and Brieh Estates ...	65.00	
Baber, E.	60.00	
Bukit Mertajam Estate	319.00	
Carless, H. G. ...	48.00	
Chersonese Estate ...	441.32	
Darke, A. E. G. ...	80.00	
Gula Kalumpang Rubber Estates ...	728.00	
Hargreaves, J. ...	40.00	
Josselyn, E. W. ...	80.00	
Mackay, C. H. ...	54.00	
Mallett, N. W. ...	50.00	
Rasmussen, G. ...	50.00	
Rickeard, H. W. ...	80.00	
Sherwood, B. ...	108.00	
		2,203.32
Carried forward ...		15,626.12

	$ c.	$ c.
Brought forward		15,626.12
NEGRI SEMBILAN.	590.00	
Adair, H.	60.00	
Adames, T. Slade ...	40.00	
Burgess, I.	88.00	
Clarkson, S. W. ...	40.00	
Crawford, W. P. ...	45.00	
Cuthbertson, T. F. ...	40.00	
Fenton, R. D. ...	80.00	
Foster, M. R. ...	20.00	
Grant, G.	80.00	
Handover, W. P. ...	40.00	
Hanmer, H. R. ...	56.00	
Hay, J. B.	34.00	
Hearn, A. J. ...	40.00	
Heherr, F. J. ...	60.00	
Hickson, C. L. O'Hara	80.00	
Hingston, G. W. ...	100.00	
King, H. W. F. ...	60.00	
Mansfield, L. ...	28.00	
Maycock, R. M. A. ...	40.00	
Mills, E. G.	400.00	
Mills, G. R.	12.00	
Paterson, A. F. ...	75.00	
Ritchie, C.	60.00	
Reynolds, K. P. ...	80.00	
Sepang Valley Estate	500.00	
Smith, E. E. ...	80.00	
Swinton, C. H. ...	80.00	
Tayler, V. A. ...	200.00	
Watt, W.	40.00	
		3,148.00
TAIPING, P.A.	508.50	
Bruas Estate ...	88.00	
Croal, T. Gordon ...	80.00	
Grant, G. A.... ...	80.00	
Moraes, H. F. ...	40.00	
Perera, C.	20.00	
Ritchie, C.	60.00	
Tate & Co.	150.00	
Willis, A.	40.00	
		1,066.50
ULU SELANGOR.	63.25	
Brunton, R.	50.00	
Coe, P. F.	40.00	
Dakeyne, N. H. ...	60.00	
Fallon, M. D. ...	80.00	
Fleming, D. J. ...	35.00	
Hastings, P. E. ...	30.00	
Kennaway, M. J. ...	100.00	
Kennedy, W. C. ...	41.00	
		499.25
Grand Total ...		20,339.87

As regards the Malcolm Cumming Memorial Fund, he had so far not yet received any remittances from Constituent Associations and only $71.88 from individuals.

Mr. KENNEDY points out that the suggestion of paying at the rate of ½ cent per acre implied that the estate as such was to pay and before that could be done Directors had to be consulted which would explain the delay.

Mr. CUMMING says that in Batu Tiga they had left it to individuals to make contributions.

Mr. QUARTLEY and Mr. LOW, respectively, report the same from Klang and Taiping.

Mr. KENNEDY suggests that the Secretary send out a further circular pointing out that private subscriptions were invited no less than contributions from estates.

Mr. MCCULLOCH seconds the proposal, which is passed.

Mr. Kindersley then takes the Chair.

3.—PREVENTIVE QUARANTINE.

The SECRETARY submits the following correspondence:

"KUALA LUMPUR,
"*16th July, 1918.*

"SIR,

"I have the honour to inform you that at the last meeting of this Association a memorandum (copy attached) on Preventive Quarantine by Mr. L. Mooijaart and Dr. Day was submitted to this Association, and after some discussion I was instructed to ask you kindly to let us have your opinion on same.

Thanking you in anticipation

"I have, etc.,

"(Sd.) H. C. E. ZACHARIAS,
"*Secretary.*

"DR. G. E. BROOKE,
"PORT HEALTH OFFICER,
"SINGAPORE."

"SINGAPORE,
"*29th July, 1918.*

"SIR,

"I have the honour to acknowledge the receipt of your letter of the 16th instant enclosing a memorandum on Preventive Quarantine by Mr. Mooijaart and Dr. Day and asking for my opinion on the same.

"2. As, however, this interesting report deals with the existing practice of the Government, I fear that, as a Government official, I am not in a position to comply with your request.

"I have, etc.,
"(Sd.) GILBERT E. BROOKE,
"*Port Health Officer.*

"THE SECRETARY,
"PLANTERS' ASSOCIATION OF MALAYA,
"KUALA LUMPUR."

"KUALA LUMPUR,
"*22nd August, 1918.*

"SIR,

"As instructed by our Chairman, I have the honour to enclose herewith copy of Mr. Mooijaart and Dr. Day's report on Preventive Quarantine.

"I understand that you have very kindly consented to forward it to the Colonial Government with a request to obtain Dr. Brooke's opinion thereon.

"I have, etc.,
"(Sd.) H. C. E. ZACHARIAS,
"*Secretary.*

"THE HON'BLE
"THE CHIEF SECRETARY,
"FEDERATED MALAY STATES,
"KUALA LUMPUR."

"KUALA LUMPUR,
"*27th August, 1918.*

"No. 3894/18.

"SIR,

"I am directed to acknowledge receipt of your letter dated the 22nd August, 1918, forwarding two copies of Mr. Mooijaart and Dr. Day's report on Preventive Quarantine.

"2. A copy of the report is being sent to the Colonial Government as requested by you.

"I have, etc.,
"(Sd.) S. MCARTHUR,
"*Under Secretary to Government, F.M.S.*

"THE SECRETARY,
"PLANTERS' ASSOCIATION OF MALAYA,
"KUALA LUMPUR."

Mr. JEAVONS regrets it as an unwise policy that the memorandum had been made public before it had been considered by the Association. For all they knew the memorandum as originally drawn up might be now in the Indian Press.

Mr. KINDERSLEY fails to see how a memorandum could be considered unless it was published. The point was that the Association had not adopted it at that time.

Mr. HARVEY agrees with Mr. Jeavons and says that as a matter of fact a Government official had a copy before he ever saw one.

Mr. SHELTON-AGAR enquires whether the policy advocated in the memorandum applied to Port Swettenham only.

Mr. KINDERSLEY replies that it applied to the whole Peninsula. As they were now awaiting Dr. Brooke's opinion on the subject there seemed no point in continuing the discussion. Of course the Association had not yet adopted the report and as soon as Dr. Brooke had given his opinion the memorandum would be considered again for adoption or otherwise.

4.—PORT SWETTENHAM QUARANTINE CAMP.

The SECRETARY submits the following reply received from the Under Secretary:

"KUALA LUMPUR,
"*16th July, 1918.*

"No. 4328/16.

"SIR,

"With reference to your letter of 29th April, 1918, on the subject of visits of inspection to the Quarantine Camp at Port Swettenham I am directed to inform you that in April, 1917, the following roster of authorized visitors was approved:

Controller of Labour.
District Officer, Klang.
Chairman, Klang District Planters' Association.
Kapar " "
K. Langat " "
K. Selangor " "
Dr. Young, W. A., M. O., Highlands and Lowlands Para Rubber Co., Klang.
Mr. Munro, R. W., Manager, Gadong Estate Syndicate, Ltd., Banting, Selangor.
Mr. Quartley, H. R., Whittall & Co., Klang.
" Fisher, N., Manager, Harpenden Rubber Co., Ltd., Kapar.
" Prior, E. B., Golden Hope Estate, Klang.
" Walker, R. K., Klang.
" Hunter, J., Jeram, Kuala Selangor.
" Bennett, G. H., Klang.
" Hendrie, R. N., Klang.

"2. It is reported that up to 21st of May of this year no visit by any of these is recorded in the visitors' book at the Quarantine Camp. Frequent visits of inspection have, however, been made this year by the Assistant Controller of Labour, Klang.

"I have, etc.,

"(Sd.) W. MACKRAY,
"*for Under Secretary to Government, F.M.S.*

"THE SECRETARY,
"PLANTERS' ASSOCIATION OF MALAYA,
"KUALA LUMPUR."

Mr. KINDERSLEY regrets that none of the gentlemen appointed had so far visited the camp.

Mr. MOOIJAART enquires who had made up the roster of visitors and had the gentlemen concerned been informed of their appointment? As for himself he never knew he was on the roster until he saw the correspondence.

Mr. MENZIES says he was informed after this letter had been written but Mr. Hunter, for instance, had not been informed yet.

Mr. CUMMING says that Mr. Bennett had heard towards the end of July.

Mr. HENDRIE says that he had a letter asking him to serve both this year and last year.

Mr. ALDWORTH would like to point out that the desire for visitors did not emanate from Government but from the Planters' Association of Malaya.

Mr. OKEDEN says that his invitation was sent by the Secretary to Resident. He would like to know how often the Controller of Labour had visited the camp.

Mr. ALDWORTH says that he had not visited the camp.

Mr. KINDERSLEY says that this matter certainly ought to be cleared up since as it stood now the Association appeared to be in the wrong.

The SECRETARY is consequently instructed to ask the Government whose business it was to inform the visitors of their appointment.

5.—EXPORT DUTY.

The SECRETARY submits the following correspondence:

"KUALA LUMPUR,
"*28th June, 1918.*

"SIR,

"I have the honour to acknowledge receipt of your letter 2928 of the 12th instant which was duly considered at a General Meeting of this Association held on the 26th instant. After full discussion I was instructed to forward to you the following resolution which was unanimously passed—*viz.*: 'That this Association is of opinion that the abolition of the sliding scale as applied to export duty on rubber is an unfair measure and request the Government to cancel the notification of 15th March, 1918, and to reintroduce the notification of 31st July, 1914, at the same time adhering to Singapore market prices as the basis for assessing the ordinary export duty.'

"I have, etc.,
"(Sd.) H. C. E. ZACHARIAS,
"*Secretary.*

"UNDER SECRETARY,
"FEDERATED MALAY STATES,
"KUALA LUMPUR."

"KUALA LUMPUR,
"*19th July, 1918.*

"No. 2928/17.

"SIR,

"With reference to your letter dated the 28th June, 1918, on the subject of the method on which the export duty on cultivated rubber is calculated in the Federated Malay States, I am directed to point out that in the year 1914 several concessions were made to the rubber industry and it was then agreed with the Unofficial Members of the Federal Council that the relief to be given should be a sliding scale; but that the duty was to be fixed on the price of first class rubber in London. At the same time further relief was given by the reduction of enhanced rent but it was also decided that the allowance of 6*d.* a lb. on the London price should be reduced to 3*d.*

"2. It is not possible for the Government to meet the wish of the planters and re-establish the sliding scale and at the same time adopt the Singapore prices as the basis for assessing export duty.

"I have, etc.,

"(Sd.) S. MCARTHUR,
"*Under Secretary to Government, F.M.S.*

"THE SECRETARY,
"PLANTERS' ASSOCIATION OF MALAYA,
"KUALA LUMPUR."

"KUALA LUMPUR,
"*28th June, 1918.*

"SIR,

"I have the honour to inform you that this Association at a General Meeting held on the 26th instant, considered the attitude taken by the Government in refusing to refund excess duty paid in error. Eventually I was instructed to forward to you the following resolution unanimously passed—*viz.*: 'That this Association draw the attention of the Government to the anomaly of Government's action in refusing to refund sums of money paid in error and wishes to record its grave disapproval of the attitude adopted by the Government.'

"I have, etc.,

"(Sd.) H. C. E. ZACHARIAS,
"*Secretary.*

"UNDER SECRETARY,
"FEDERATED MALAY STATES,
"KUALA LUMPUR."

"KUALA LUMPUR,
"*16th July, 1918.*

"No. 3185/18.

"SIR,

"I am directed to acknowledge receipt of your letter dated the 28th June communicating the following resolution of the Planters' Association of Malaya:

"'That this Association draw the attention of the Government to the anomaly of Government's action in refusing to refund sums of money paid in error and wishes to record its grave disapproval of the attitude adopted by the Government.'

"I have, etc.,

"(Sd.) A. CALDECOTT,
"*for Under Secretary to Government, F.M.S.*

"THE SECRETARY,
"PLANTERS' ASSOCIATION OF MALAYA,
"KUALA LUMPUR."

Mr. KINDERSLEY thinks that the reply was by no means satisfactory but presumably they could now only wait and see what action the Rubber Industry Protection Commission would take.

Mr. KENNEDY says he would like to draw the attention of the meeting to one or two points contained in the Under Secretary's letter.

It is stated in the letter 'I am directed to point out that in the year 1914 several concessions were made to the rubber industry and it was then agreed with the Unofficial Members of the Federal Council that the relief to be given should be a sliding scale.'

Now let them analyse what the so-called concessions have really amounted to. Prior to 31st July, 1914, Government assessed the duty on a $2\frac{1}{2}$ per cent. *ad valorem* basis on the value of each of the different grades, that is to say, on No. 1, 2, and 3 which was undoubtedly a most satisfactory manner to producers in dealing with export duty, but as the checking of the different grades at the customs stations gave the officials infinite trouble and as it also left a loophole for sharp practice on the part of dishonest producers Government very naturally felt it would be a distinct advantage to itself to have an all-in assessment arrangement and thus be saved the trouble of checking the different grades, and at the same time remove temptation out of the way of producers who might be tempted to take a mean advantage of Government, and so in 1914 Government said to producers through the medium of the Unofficial Planting Members of Council 'If you will agree to an all-in assessment for duty, we on our part will make a reduction in quit rent and will also concede a sliding scale for export duty the principle of which will be that when the price of rubber falls to 2*s.* per lb. or under a graduated scale of duty will come into force and will continue until the price of rubber falls below 1*s.* 6*d.* a lb. when no duty will be chargeable.'

This proposal of Government's seemed rather alluring and so producers said 'We agree' but 'Ah! Gentlemen, little did producers' then see the pitfalls ahead of them in this same sliding slippery scale.'

Now when this arrangement was made the Unofficial Members of Council were certainly under the impression that the all-in assessment really meant that the average price of the different grades would be taken as a basis for assessing the duty, but, what really happened was Government took the price of the highest grade for assessing duty on all grades so that there was no mistake about the all-in business, the result of this has been that producers have ever since had to pay a much heavier duty than under the old arrangement, so that I ask you, who has gained financially over this arrangement, Government or producers?

Then with regard to the 'sliding scale' we read in the Under Secretary's letter, 'that the relief to be given should be a sliding scale.'

It will be admitted that if ever relief has been necessary in the history of the rubber industry it has been necessary lately. Well, of course we have just lately been 'relieved' of the sliding scale, so that no doubt is the form of relief Government intends we should have.

Of course it may be that we are unjustly criticizing Government's action regarding the disappearance of the sliding scale, as it is just possible that we may have interpreted wrongly Government's meaning of the actual word 'sliding' because on referring to my dictionary I found it to mean in addition to other things 'something slippery,' 'apt to slip away,' 'uncertain,' 'back sliding,' 'to slide or fall back in faith,' and as all these things have been fulfilled in connection with the 'sliding' scale we have perhaps not so very much to grumble at after all. However, what concerns us most is that the sliding scale has slid to the great disadvantage of producers, so again I ask you who has gained over this arrangement and who has obtained the greater 'relief,' Government or the producer?

It is also stated in the letter 'but that the duty was to be fixed on the price of first class rubber in London.'

There was no other market but London at the time the arrangement was made and the Unofficial Members of Council certainly did not think that the duty for all grades was to be fixed on the price of the highest grade.

Then again we read in the Under Secretary's letter 'At the same time further relief was given by the reduction of enhanced rent, but it was also decided that the allowance of 6*d*. a lb. on the London price should be reduced to 3*d*.'

We admit relief was given in regard to reduction of rent, which was also conceded in part consideration of the all-in assessment but we have also to keep in view the important fact that, here again Government scored to a certain extent, inasmuch as, it reduced the allowance for freight and charges on the London price from 6*d* to 3*d* per lb. which means that after the reduction of rent took place

producers had to pay duty on an extra 3*d* per lb. on every pound of rubber produced, so here again Government's beneficence was not overstrained.

Having analysed these points he fails to see where the several concessions come in as stated in the Under Secretary's letter, and in fact I think the analysis substantially proves that producers are now in a worse position than ever they have been before as regards export duty. In view of Government's recent action in the matter it will be useful to recall what took place at the 1917 November Session of the Federal Council where our Chairman, Mr. Kindersley, raised the question of assessing the duty on Singapore prices.

The formally prepared reply by the Chief Secretary was as follows:

'In 1914 an arrangement was come to after consultation with the Unofficial Members of the Federal Council and very great concessions were granted to the rubber industry. It was then agreed that the London price should be taken as the basis for calculating duty, and although on several occasions Singapore prices have exceeded the London prices this arrangement has been adhered to, and the Government is unable to agree to any alteration of the present arrangement unless the whole question is re-opened.'

Mr. KINDERSLEY expressed himself as dissatisfied with the Chief Secretary's reply and so later His Excellency the High Commissioner said in regard to Mr. Kindersley's observations: 'that the honourable member had referred to the Government duty on rubber and said that he was not satisfied with the answer given to his question and that it should be remembered that times had changed. As to that it was a question of the agreement made. If one position of that was to be modified His Excellency considered that the whole agreement should be taken back. But he was quite willing that the question should be gone into further.'

As they knew the question was never re-opened, and they were given no opportunity whatever of discussing the matter. It is, therefore, hard to reconcile these two statements with Government's subsequent action in the matter.

Under these circumstances he did not think they could be blamed if they take the view that Government deliberately snatched at the point between London and Singapore markets in order to evade its moral obligation with regard to the sliding scale.

As Government took the Unofficial Members of Council into its confidence in the framing of the new arrangement in 1914 it would have been a sign of good faith to have again done so in 1918 before such a momentous step was taken as the cancelling of the sliding scale.

To put the whole thing in a nut-shell, it is not the monetary loss to producers entailed by the cancelling of the sliding scale that has raised our protest but the method which Government has thought fit to adopt in dealing with such an important matter concerning the premier industry of the country.

Such action on the part of Government only undermines that confidence it should endeavour to inspire in public bodies such as this but by its action in this particular case it has succeeded well in sowing the seeds of deep distrust." (Applause.)

He would now move the following resolution:

"This Association desires to record its strong disapproval of Government's action in refusing to re-establish the 'sliding scale' which was an essential part of the 1914 arrangement in connection with export duty.

"In view of the statement by the Chief Secretary at the 1917 November Session of the Federal Council that 'Government was unable to agree to any alteration of the present arrangement unless the whole question was re-opened' and also the statement by His Excellency the High Commissioner that he was 'quite willing that the question should be gone into further' this Association is astounded at Government's subsequent action being diametrically opposed to the Chief Secretary's and His Excellency's declarations.

"The Association considers it most regrettable that Government did not on this occasion follow its commendable procedure of 1914 by consulting the Unofficial Members of Council before such a drastic alteration was made in the 1914 agreement and which step has caused profound dissatisfaction to the whole industry."

Mr. Mooijaart considers that the Association was under a great obligation to Mr. Kennedy for his statement in respect of this question. As regards what the Chairman had told them he would like to know whether the question of export duty came within the scope of the Commission.

Mr. Kindersley replies in the affirmative at least as a measure of temporary relief. As for the resolution he would prefer to see action deferred until their next meeting.

Mr. Ferguson strongly supports Mr. Kennedy on behalf of the Central Perak Association and would heartily support his resolution.

Mr. Ritchie thinks that the Commission's decision on the point could not deal with the state of affairs which would remain as it was to-day when the present crisis had passed away and it was merely a question of policy whether for the time being they should let the matter stand over or whether at this juncture they should send such a protest to Government.

Mr. Cookson favours action in preference to further waiting.

Mr. Gordon-Brown suggests that the resolution be shortened and that all recriminatory language left out.

Mr. Hickson disagrees and thinks that no terms of their complaint could be too strong.

Mr. Phillips believes that a little *suaviter in modo* might be a welcome change and be more effective.

Col. Fox agrees with Mr. Gordon-Brown. Most officials read the papers and from the report of this meeting they would know exactly what planters thought without the necessity of their having to put it all into that resolution.

Mr. SHELTON-AGAR observes that Mr. Kennedy's resolution merely stated facts and he did not understand how a question of moderation did arise.

Mr. HARVEY supports Mr. Phillips and thinks that the Government and the producer necessarily had to pull together. This was a most critical time and he would counsel members to restrain their impulses.

Mr. KENNEDY has no wish to be impulsive. If the meeting wished he would not press his resolution but Mr. Harvey's argument seemed to him really to amount to this "that they wanted something from Government now and that, therefore, they ought to smooth them down and after they got what they wanted then they should let them have it."

Mr. HARVEY accepts the interpretation. (Laughter.)

The CHAIRMAN then puts to the meeting the following amendment proposed by Mr. Gordon-Brown, and seconded by Mr. Harvey: "In view of the statement by the Chief Secretary at the November 1917 Session of the Federal Council that Government was unable to agree to any alteration in the present arrangement unless the whole question were re-opened and also the statement by His Excellency the High Commissioner that he was quite willing that the question should be gone into further, this Association requests that this step be taken in due course."

Mr. GORDON-BROWN'S amendment is lost by 16 votes to 26.

The CHAIRMAN then puts Mr. Kennedy's resolution to the meeting and declares it carried by 26 votes to 15.

---

6. LABOUR.

(*a*).—RECRUITING IN INDIA.

The SECRETARY submits the following correspondence:

"KUALA LUMPUR,
"*22nd July, 1918.*

"No. 182/16.

"SIR,

"In continuation of my letter of even number dated 11th May last, I have the honour to inform you that the Government of Madras on the 21st June authorized 'the return to Malaya of all kanganies under 25 now in the Madras Presidency who have left their wives in Malaya and are holders of authorized licences to recruit labour for Malaya. This permission is subject to the condition that the kanganies return to Malaya before the 30th September, 1918.'

"The Emigration Agents at Madras and Negapatam have been required to submit to the Madras authorities monthly returns showing the number of kanganies thus shipped to Malaya.

"I have, etc.,

"(Sd.) J. R. O. ALDWORTH,
"*Controller of Labour, F.M.S.*

"THE SECRETARY,
"PLANTERS' ASSOCIATION OF MALAYA,
"KUALA LUMPUR."

"PENANG,
"*25th July, 1918.*

"No. 9 in I.I.C. (Misc.) 37C/18.

"SIR,

"As it will probably be of interest to many of your members I have the honour to inform you that cholera broke out in the Avadi Depôt towards the end of May. The first cases were among coolies from the Villupuram *taluq*. All the coolies coming from this *taluq* were immediately sent back to their villages at the cost of the Immigration Fund.

"2. Later some coolies from Waltair fell ill.

"3. Every effort was made to detain the coolies left in the depôt, but large numbers absconded.

"4. The Telugu coolies were all found in Madras. As they could not be induced to return to Avadi arrangements were made to send them to their homes at the cost of the estates concerned.

"5. The epidemic had entirely subsided at the beginning of July and coolies were again admitted to the Avadi Depôt on the 7th instant. It would not seem that the outbreak will have any appreciable effect on recruiting.

"I have, etc.,

"(Sd.) E. W. F. GILMAN,
"*Deputy Controller of Labour, Penang.*

"THE SECRETARY,
"PLANTERS' ASSOCIATION OF MALAYA,
"KUALA LUMPUR."

Mr. GRAY says that a great number of coolies were now coming over from India who were of a very inferior physique. Dr. Giddy had described one batch as famine coolies. He would like to know whether other districts had suffered in the same way. It went without saying that they could not expect young robust men nowadays but there was surely no point with the present congestion on steamers to send over these useless coolies.

Mr. REEVE-TUCKER agrees and says that he had had to repatriate quite a number lately.

Mr. OKEDEN corroborates the statement from his own experience.

Mr. DAKEYNE says that his last batch were quite up to the average although the previous two had been inferior.

Mr. ALDWORTH says that the complaint usually was that examination was too strict but he had never heard a complaint that the examination was not strict enough. Surely the best way to improve the situation was by dealing with the kanganies responsible for recruiting such men. Perhaps a sudden drop in physique was due to the closing of the Madras camp for three weeks. He would add that it seemed not generally known that by paying one rupee per cooly they could get them examined medically to any standard set by the employer.

Mr. HARRISON hopes that they would not risk stopping the supply by making this complaint. Obviously, with the little shipping space available it should be kept for the best class of coolies only.

Mr. RITCHIE has not had the same experience although he admits that he had for a long time paid this fee of one rupee.

Mr. JEAVONS thinks that they were asking for trouble and that obviously the simplest way out was for them to pay their rupee.

Mr. KENNEDY supports Mr. Jeavons.

Mr. BRADBURNE reports that he also was now paying a fee of one rupee with the result that the standard of coolies coming over was a very good one.

Mr. GRAY consequently withdraws his suggestion.

(*b*).—KANGANI LICENCES.

Mr. OKEDEN calls attention to the present practice of issuing kangani licences only in Penang which entailed great loss of time and money on behalf of the kanganies. He produces correspondence which had passed between him and the Labour Department which showed how difficult it was to carry on business of this sort by letter. He fails to see why the officer of the Labour Department stationed in each State should not be given authority to interview the kanganies and issue licences according to the number allowed to each estate. He would, therefore, propose that the Standing Committee of the Planters' Association of Malaya be requested to arrange with the Immigration authorities that kanganies obtain their licences from the Deputy Controller of Labour for the district in which their estate is situated.

Mr. RITCHIE seconds the proposal and thinks there should certainly be one office in each State, so as to do away with the present uncertainty as to whether a kangani could get a licence or not after he had set out on his journey.

Mr. ALDWORTH says that the Indian Immigration Committee had had no doubt good reasons for making the present rule but he was quite willing to bring up the question at the next meeting of the Indian Immigration Committee. (Applause.)

(*c*).—REGISTRATION OF LOCALLY RECRUITED LABOUR.

Mr. HARRISON says that in connection with the non-registration of locally recruited labour the onus was placed on planters which was an invidious, lengthy and costly procedure.

Mr. OKEDEN draws attention to the fact that the Chief Secretary's Report for 1917 stated that 28 per cent. of the whole Indian labour force on estates had deserted during the year.

Mr. PHILLIPS enquires whether they could not appoint inspectors to check these registers and get the funds for their payment from the present assessment.

(*d*).—CHOULTRY.

Mr. OKEDEN wishes to bring up again the question of a choultry at Port Swettenham. The condition there was pitiful. Surely it was up to the Government to do something in the matter,

but not only had they done nothing but they had even withdrawn the permission for the use of a shed and threatened to withdraw the grant of land made unless private subscriptions came in more freely. He suggests that the Indian Immigration Committee ask the Government for the paltry $5,500 required.

Mr. ALDWORTH says that he had made the suggestion regarding the withdrawal of the offer of land. In India wealthy Indians were eager to erect choultries and he had no doubt that if there had not been this agitation for Government money private individuals would have raised the sum required long ago.

Mr. MOOIJAART supports Mr. Okeden that it was the duty of the Government to take up this matter.

Mr. JEAVONS agrees that a choultry was necessary and suggests that the Indian Immigration Committee be again approached.

Mr. OKEDEN then proposes, Mr. JEAVONS seconds and it is carried: "That the Planters' Association of Malaya lay the matter very strongly of the building of a choultry at Port Swettenham before the Indian Immigration Committee, with a view of this choultry being erected out of public funds as it is for the benefit of the public and not a matter for planters only or of private subscription."

(*e*).—JAVANESE LABOUR.

The SECRETARY reads correspondence.

7.—CROP RESTRICTION.

The SECRETARY submits the following correspondence:

"KUALA LUMPUR,
"*28th June, 1918.*

"YOUR EXCELLENCY,

"I have the honour to inform your Excellency that at a General Meeting of this Association held on the 26th instant I was instructed to submit to your Excellency a resolution unanimously passed at the said meeting—*viz.*: 'That this Association request the local Government forthwith to approach the Imperial Government to ascertain whether they are prepared to undertake the control of the plantation rubber production and market, in accordance with the needs of the Allied countries, and further that the Governments of other producing countries be informed of such action and asked to co-operate.'

"I have the honour to be,
"Your Excellency's most obedient and
"humble servant,

"(Sd.) H. C. E. ZACHARIAS,
"*Secretary.*

"HIS EXCELLENCY
"SIR ARTHUR YOUNG, G.C.M.G.,
"GOVERNOR, STRAITS SETTLEMENTS AND
"HIGH COMMISSIONER, FEDERATED MALAY STATES,
"SINGAPORE."

"HIGH COMMISSIONER'S OFFICE,
"SINGAPORE, *12th July, 1918.*

"No. 1155/18.

"SIR,

"I am directed to acknowledge the receipt of your letter of the 28th June forwarding a copy of a resolution of the Planters' Association of Malaya in the following words:

> 'That this Association request the local Government forthwith to approach the Imperial Government to ascertain whether they are prepared to undertake the control of the plantation rubber production and market, in accordance with the needs of the Allied countries, and further that the Governments of other producing countries be informed of such action and asked to co-operate.'

"In His Excellency's opinion it is of little use to ask the Imperial Government such a question without adducing some arguments or reasons for asking it; and in the absence of such arguments and reasons His Excellency regrets to be unable to comply with the Association's request.

"I have the honour to be,
"Sir,
"Your obedient servant,

"(Sd.) W. GEORGE MAXWELL,
"*Ag. Secretary to the High Commissioner for the Malay States.*

"THE SECRETARY,
"PLANTERS' ASSOCIATION OF MALAYA,
"KUALA LUMPUR."

"KUALA LUMPUR,
"*13th July, 1918.*

"SIR,

"I have the honour to acknowledge receipt of your letter 1155 dated the 12th instant.

"In reply I am instructed to point out that the resolution of this Association implied only a question and not a request for action.

"If His Excellency desires a reason for this Association asking such a question, I am to say that, with the present collapse of the Singapore market and the restriction of imports of rubber into the United States, the contingency must be considered by the planting community of rubber becoming either altogether unsaleable locally or else realizing only so low a price as to make its further production unremunerative.

"In view of such possibilities in the near future, this Association —very naturally—desires to ascertain whether the Imperial Government have at all considered the control of the plantation rubber production and market.

"I have, etc.,

"(Sd.) H. C. E. ZACHARIAS,
"*Secretary.*

"SECRETARY TO H. E. THE HIGH COMMISSIONER,
"FEDERATED MALAY STATES,
"SINGAPORE."

RESOLUTION FROM THE BATANG PADANG DISTRICT PLANTERS' ASSOCIATION.

"We are of opinion that the proposals of the Local Committee of the Rubber Growers' Association, as sent, are hardly definite enough to submit to a General Meeting of the Association. It is not that we are against restriction, but rather that the scheme as so far outlined does not seem to make sufficient allowance for individual cases: it appears only to take into account certain acreage considerations; our Committee, at a recent meeting when restriction policy was discussed, felt that more searching enquiries than these should be instituted into such questions as dividends recently earned, reserve capital, balances carried forward, estimated crop and revenue expenditure for the current year, before any Control Committee could fairly lay down what output-limit should be imposed on any one rubber company.

"It should not be impracticable for small Local Committees to gather and tabulate such records and decide in General Meeting of all estates in their districts what percentage of the total output allowed to that district should be allocated to each individual company . . . it being the province of the Control Committee to apportion the totals for the diffent districts.

"In general we are in favour of Government control and crop restrictions but wish to obviate, as far as possible, any risk of inequality of hardship."

RESOLUTION FROM THE KAPAR DISTRICT PLANTERS' ASSOCIATION.

"That this Association is not in favour of interference by Government in regard to crop restriction until more is known of the requirements of the Allies, but that if it is found that general crop restriction of all rubber producing countries is required we think that the scheme put forward by the Planters' Association of Malaya is a workable one."

Mr. KINDERSLEY says that the question of crop restriction was now being considered by a Commission appointed by the Government and it was hoped that it would be possible at an early date to cable Home its findings. They had no doubt read in the newspapers of the extraordinary action of the Government in connection with the telegram received by them from the Secretary of State for the Colonies on 20th July containing the Rubber Growers' Association's scheme to deal with the present prices. It was

almost beyond belief that the Government should have cabled a reply in fact condemning that scheme without consulting the Planters' Association of Malaya or at least the Unofficial Members of Council. Yet the following reply was sent by cable on 27th July—*viz.*: "That as a temporary measure legislation might be passed for the reduction of rubber production but that the suggestion of the Rubber Growers' Association in regard to a licensing system could not be carried out without a very large staff, and that such staff could not be obtained. Government considered that perhaps the most practicable scheme but by no means an easy course to carry into proper effect would be to prohibit tapping on certain days in the week. This action, however, was not recommended unless other rubber producing countries take similar action to reduce their output. The Government was strongly opposed to the Rubber Growers' Association's proposals for the appointment of a Control Committee in London and of Local Committees with executive powers, nor were they in favour of fixing a minimum price between parties."

One would imagine that the Unofficial Members were appointed for the very purpose of assisting the Government to come to a conclusion in such cases. This was the greatest crisis that had ever confronted the rubber industry and notwithstanding the warning contained in the cable of 20th July, Government had allowed a whole month to elapse before they thought fit to consult the representatives of the industry and even then only under pressure from the Unofficial Members of the Council. What the reasons were that led the Government to adopt the course that they did were beyond understanding. At the time they received the cable from the Secretary of State the resolution by the Planters' Association of Malaya was in their hands and must have conveyed to them what considerable anxiety was being felt locally and yet nearly a month afterwards in answer to a question put by him on 13th August in the Federal Council they stated "the view of the local Government is that sufficient cause has not been shown for the Imperial Government undertaking such control." Or in other words the Government failed to realize the gravity of the situation that had arisen in this country. They still withheld the information that they themselves had been approached by the Imperial Government, their first intimation of that being the reprint in the *Malay Mail* of the Secretary of State's cable of 20th July from the *Times of Ceylon* of 2nd August which informed them that the Government of Ceylon had already appointed a representative Committee and they had since learnt that similar action had been taken by the Governments of India and Burma.

He believed that at last their Government had realized the gravity of the position and were doing now all in their power to assist the Commission so that there should be no further unnecessary delay. The whole question was now being gone into by this Committee but of course the members of the Committee could not divulge for the time being the nature of the discussions but he could say that he considered the Rubber Growers' Association's scheme to have been very carefully drawn up and to be quite practicable and he, therefore, thinks that this meeting might well express its approval on general lines of such a proposal as the Rubber Growers' Association's scheme.

Mr. KENNEDY supports the suggestion made by the Chairman and has pleasure to move "that this Association approves in broad principle the scheme drawn up by the London Rubber Growers' Association."

Col. FOX seconds the proposal.

Mr. MENZIES enquires what the Rubber Growers' Association's scheme consisted in.

Mr. KINDERSLEY replies that the scheme was very much on the lines of Mr. Harvey's scheme published at the last meeting, that it suggested the restriction of crop to 125 lbs. per acre and fixed the minimum price at $1 per lb.

Mr. JEAVONS hopes that the Commission would consider the question of the importation of Dutch rubber into Singapore. (Hear, hear.)

Mr. KENNEDY's motion is then put to the meeting and carried unanimously.

The SECRETARY reports having sent out circulars asking for the total stock of rubber on estates on 31st July and, as a comparative standard, for the production during July. The following figures were the summary of the replies received:

Districts.	Total stock of rubber on estates on 31st July, 1918.	Production during July, 1918.
	lbs.	lbs.
Batang Padang	428,711	320,105
Batu Tiga	645,069	391,389
Central Pahang	118,257	95,353
Central Perak	890,619	579,399
Johore	1,524,693	1,031,262
Kajang	733,054	573,997
Kapar	577,703	413,434
Kelantan	339,515	318,074
Klang	594,480	336,533
Kuala Langat	599,713	271,989
Kuala Lumpur	903,709	595,554
Kuala Selangor	1,041,114	695,210
Lower Perak	828,732	481,273
Malay Peninsula Agricultural Association	1,512,131	1,218,280
Negri Sembilan	2,731,589	1,688,030
Taiping	750,678	582,548
Ulu Selangor	274,902	292,872
Total ...	14,494,669	9,885,302

Mr. HARVEY suggests that for the time being similar returns should be asked for every month.

Mr. KENNEDY hopes that those members who had not yet replied *re* July figures would again be asked to do so and that these figures would be included in the statement.

Both suggestions are agreed to and the Secretary is instructed accordingly.

The SECRETARY reports the receipt of a resolution from the Johore Planters' Association on the subject of crop restriction but that same had been withdrawn. He then reads the following correspondence *re* baling:

"SINGAPORE CHAMBER OF COMMERCE RUBBER ASSOCIATION,
"SINGAPORE,
"*20th August, 1918.*

"DEAR SIR,

"PRESSING AND BALING OF RUBBER FOR AMERICA.

"At the request of our Committee we are sending you herewith copies of correspondence between ourselves and the Overseas Committee of the Rubber Association of America, in connection with this matter, for your information.

"Yours, etc.,
"(Sd.) GATTEY AND BATEMAN,
"*Secretaries.*

"THE SECRETARY,
"PLANTERS' ASSOCIATION OF MALAYA,
"KUALA LUMPUR,
"FEDERATED MALAY STATES."

The SECRETARY submits the following letter:

THE SINGAPORE CHAMBER OF COMMERCE
RUBBER ASSOCIATION.

"CHARTERED BANK CHAMBERS,
"SINGAPORE,
"*20th August, 1918.*

"DEAR SIRS,

"PRESSING AND BALING RUBBER FOR
SHIPMENT TO AMERICA.

"We append below, for your information, a copy of the Second and Final Report by the Sub-Committee.

"Yours faithfully,
"GATTEY AND BATEMAN,
"*Secretaries.*

"THE SINGAPORE CHAMBER OF COMMERCE
RUBBER ASSOCIATION.

"GENTLEMEN,

"The Sub-Committee appointed at the Extraordinary General Meeting of the Association held on the 23rd May, 1918, to consider the question of pressing and baling of rubber for shipment to America has the honour to submit its Second and Final Report.

"1. *Sub-Committee.*—The Sub-Committee remains as before and consists of Messrs. W. Lowther Kemp (Chairman), J. J. Blandin, John Donaldson, M. A. Cheek, H. S. Godwin, R. J. Obott and P. H. Patterson.

"2. *Presses.*—One hundred of the presses ordered and forwarded by the Rubber Association of America have recently arrived. A demonstration of the capacity of these presses will take place shortly in Singapore under the direction of the Overseas Committee of the Rubber Association of America so that any members interested may have an opportunity of judging for themselves as to their merits.

"It has been decided to allot 30 of these presses to Colombo and 15 each to Medan and Batavia. Orders for 26 have so far been received from the Straits and F.M.S.

"Orders for 16 locally made presses have also been placed by the Sub-Committee.

"3. *Compression.*—In the opinion of the Sub-Committee it should be possible, ultimately, to fix as a minimum quantity 225 lbs. of sheet rubber and 175 lbs. of crêpe rubber per five cubic feet, this being a safe limit, but until further experience is gained and the capacity of the American presses is more definitely ascertained they do not recommend that the Chamber of Commerce should approve a limit of more than 220 lbs. of sheet and 160 lbs. of crêpe rubber per five cubic feet.

"4. *Packing.*—There appears to be a sufficient supply of burlap and white cheese cloth available for present purposes and a supply of binding wire has been received from America so that shippers wishing to pack in bales should not be prevented from so doing by lack of materials in the immediate future. Thereafter they can make their own arrangements and the Sub-Committee understands that Government has promised its assistance in obtaining supplies of burlap from India if this should be necessary.

"5. *General.*—Your Committee is of opinion that at least one month's notice should be given before any regulations as to minimum quantities to be packed are brought into force and that no regulations should in any case take effect before the 31st August next.

"The Sub-Committee begs to point out that the present regulations as to quantities to be imported into Great Britain and the United States of America are based on tons weight and not on tons measurement so that the pressing of rubber to save shipping space does not result in any advantage to the industry in the way of licences to ship increased quantities.

"6. *C.I.F. and Forward Contracts.*—A letter from the Chairman of the Rubber Association of America on this subject dated the 11th May has already been circulated to the members of the Chamber of Commerce Rubber Association. The opinion of the American Association is that rubber of the right quality here will turn out in good condition on delivery although pressed and that while it is not possible to lay down any definite rule to determine any disputes as to whether pressing has or has not affected quality the situation should be met in a spirit of mutual and friendly co-operation without either side attempting to take any undue advantage of it.

"7. *Conclusion.*—The Sub-Committee feels that the purposes for which it was appointed have now been fulfilled and begs therefore to tender its resignation with this Report.

"Yours faithfully,

"(Sd.) W. LOWTHER KEMP,
"*Chairman of Sub-Committee.*

"SINGAPORE, *15th July, 1918.*"

Mr. RITCHIE understands that baled rubber was unsaleable in London and if it was wanted in the United States of America it made it very difficult for estates as the manager was not aware until the last moment as to whether a certain parcel of rubber was going to be shipped to the United Kingdom or to the United States.

Mr. KINDERSLEY has been informed that shippers would charge baled rubber on dead weight rates.

Col. FOX has had a report on baled rubber from London which was to the fact that pressed rubber could not be classed as No. 1.

Mr. MCCULLOCH says that the Singapore market also objected to pressed rubber.

Mr. HARVEY thinks that if rubber was to be baled that would have to be done in Singapore as it seemed quite impracticable to do it on the estate.

Mr. KENNEDY disagrees and thinks that estates who had contracts to fulfil in the United States would have to bale their rubber on the estate.

8.— FOOD SUPPLY.

The SECRETARY submits the following correspondence:

"KUALA LUMPUR,
"*28th June, 1918.*

"SIR,

"I have the honour to acknowledge receipt of your letter 2379 of the 16th May and am instructed to ask whether the Railway would allow truck rates for the transportation of all quantities of rice to estates obtaining their supplies from the mills direct.

"I have, etc.,

"(Sd.) H. C. E. ZACHARIAS,
"*Secretary.*

"GENERAL MANAGER,
"FEDERATED MALAY STATES RAILWAYS,
"KUALA LUMPUR."

"KUALA LUMPUR,
"*9th July, 1918.*

SIR,

"With reference to your letter of 28th ultimo, I have the honour to inform you that the Railway is precluded by law from charging any one trader or class of traders lower rates than it charges other traders for the same or similar service.

"I have, etc.,
"(Sd.) G. H. Fox,
"*Ag. General Manager.*

"THE SECRETARY,
"PLANTERS' ASSOCIATION OF MALAYA,
"KUALA LUMPUR."

The meeting adjourns at 1 p.m. until 2.30 p.m.

Mr. MOOIJAART asks before proceeding with the next business whether a special General Meeting would be called to consider the finding of the Rubber Industry Protection Commission.

Mr. KINDERSLEY replies in the affirmative.

9.— MEDICAL.

The SECRETARY reports having been instructed by the Negri Sembilan Planters' Association to place on the agenda the subject of fees charged for operations on estate coolies in Government hospitals.

Mr. RITCHIE says that since a few months ago the local authorities at Negri Sembilan had begun to send in bills on account of operations performed on coolies in hospitals. He understands that in the Klang district a circular had been issued informing planters that certain fees would be charged but that since then the circular had been withdrawn. There certainly seemed to be a great difference of practice according to the various districts and he would like the Secretary to make enquiries as to what the Government rate was.

Mr. GRAY says that in Lower Perak these charges were certainly made but what they wanted to know was on whose authority they were made.

Mr. PHILLIPS reports that a member in his district who had received such bills had sought legal advice and had learnt that the Government had no legal right to make such charges. He understands that the Senior Medical Officer had asked the Government to sanction these charges but if this was illegal the members of his Association would not entertain such bills.

Dr. WATSON says that he had been informed that a certain scale of fees had been fixed but two days later a further notification arrived that the scale was further being considered and had, therefore, been withdrawn for the time being.

Mr. MOOIJAART would like to know why these charges should have been made—*viz.*, did they promote the good Government of the country or the interests of the cooly or the interests of medical men ?

Mr. MCCULLOCH agrees that until these charges had been gazetted they were illegal and he suggests that the Controller of Labour take action in the matter.

Mr. KINDERSLEY proposes that the Secretary be instructed to write to the Under Secretary in order to find out exactly how the matter stands.

Mr. JEAVONS agrees but thinks that after a reply had been received it might be advisable to ask for legal advice.

Mr. RITCHIE would add that the Standing Committee be authorized to take action if necessary, after a reply had been received.

Mr. KINDERSLEY'S proposal as amended is agreed to.

10.—RUBBER THEFTS.

The SECRETARY reports having received from the Rubber Growers' Association to whom this question had been referred, copy of the reply received by them from the Under Secretary of State for the Colonies, in reply to their letter of 1st February which read as follows:

"With reference to your letter of the 1st February, 1917, transmitting a memorandum by the Standing Committee of the Planters' Association of Malaya on the subject of rubber and latex thefts, I am directed by Mr. Secretary Long to express his regret that he has not been able to give you an earlier reply, as he was not in possession of the views of the High Commissioner for the Malay States on the subject. A despatch has now been received from Sir Arthur Young, the substance of whose views is as follows:

"2. The whole subject has been under the most careful consideration and some of the proposals put forward in the memorandum, prepared by the Standing Committee of the Planters' Association of Malaya, have been referred to the State Councils for an expression of their views.

"3. In the memorandum it is contended that 'The Mineral Ores Enactment, 1904,' has been a success, and that 'The Federal Rubber Dealers Enactment, 1909,' has been a failure and that the reason for this is that there is a staff of officers to carry out the duties of the first, but not of the second Enactment.

"4. The allusion to 'The Mineral Ores Enactment, 1904,' is an unfortunate one, for experience has shown that this measure is practically useless for the purpose for which it was intended. The Senior Warden of Mines has recommended that, for that reason, the Government of the Federated Malay States should consider the advisability of repealing it. The object of the Enactment was partly to check illicit mining on State lands and partly to check petty thefts of tin-ore by the coolies employed in the mines. It has been found that the Government can best preserve the State lands by maintaining an outdoor staff, and that pilfering on mines can be stopped by the miners employing a preventive staff.

"5. That there are thefts of latex and rubber is beyond doubt. They are undoubtedly annoying and vexatious to the managers, but the High Commissioner is not satisfied that they are in any way serious. They take the form of petty pilfering. But every now and again there is an organized burglary of a rubber store in exactly the same way as there would be a burglary of any building containing valuable and portable property.

"6. Having regard to the enormous area of land in the Malay States under rubber cultivation, and to the accessibility to most estates from the public thoroughfares, it would be extraordinary if there were no pilfering. It is common knowledge that, everywhere, pilfering will take place, if valuable property in large quantities is easily accessible to individuals. There is pilfering, for instance, at all big dockyards and in all big shops. And yet both in the docks and in the shops, precautions, which are not taken by the rubber planters, are used and systematically carried out by the management.

"7. Sir Arthur Young can see no reason why the Government should provide a staff of watchman and detectives to protect the estate-proprietors against their employees who are generally the thieves or the accomplices of the thieves. Upon this point the writer of the memorandum expresses himself as follows:

"'The Government reiterate every time, on their being approached that owners of the rubber estates fail in their duty of protecting their property adequately. Nobody who is conversant with the elaborate methods of checks and the number of watchmen employed on large estates can fail to see that such a contention is altogether fatuous.'

"In reply to this Sir Arthur Young observes that, if the checks are adequate, there would be no thefts.

"8. The Government of the Federated Malay States has the difficult task of adopting a course that is fair to the interests of both the large and the small proprietors, who would be affected prejudicially by any increased difficulties in retail rubber dealing, and its policy may be summed up in the words used by Sir William Taylor in the Federal Council when 'The Federal Rubber Dealers Enactment, 1909,' was introduced. The words are quoted in the memorandum now under reference. Sir William Taylor said:

"'Of course the Government would not undertake the protection of the rubber estates, nor would it be prepared to relieve the rubber growers from their bounden duty of guarding their estates. But it is prepared to assist them: *provided that it can be done in such a way as not to be injurious to the industry, and that it does not harass those who are concerned in the industry.*'

"9. Six recommendations are put forward in the memorandum.

(i) The first is that the number of Agricultural Inspectors be increased, and that the Enactment be amended so as to require accounts to be kept in English or romanized Malay. The High Commissioner's view is that such an increase in the number of these European officers would not be justified merely for the purpose of the Enactment. Most of the licensed dealers, of whom there were 433 in the Federated Malay States in 1916, are Chinese, of whom the majority are ignorant of the English language and

unable to write in romanized Malay. As a rule, they deal in a small way with small cultivators, who are equally ignorant of the English language. Their profits on each individual transaction are small, and if they had to keep English-speaking clerks, their price to the rubber-cultivator would necessarily be reduced.

(ii) Secondly, a restriction in the number of licences is asked for, together with an increase in the licensing fee and deposit. Sir Arthur Young is of opinion that 433 licensed dealers is not too large a number for an area of 250,000 acres under cultivation by small proprietors. As a concession to the European planting community, the licensing fee was raised in December, 1916, from $25 to $100 by Enactment No. 28 of 1916. It was considered advisable to ask for two good securities in $1,000 each, on the ground that, as evidence of good reputation and standing, the provision of two acceptable sureties is better than a cash deposit.

(iii) Thirdly, the reward of informers by part of the fines is asked for. Such a system would tend to produce a class of professional informer, with the false witness and the fabricator of false evidence. Sir Arthur Young has no objection to estate managers offering substantial rewards for evidence that will lead to a conviction But even this system has to be most carefully watched; and Magistrates, very rightly, are chary of convicting on the evidence of men who are paid by results.

(iv) Fourthly, any law fixing a minimum quantity for sale, and prohibiting barter would operate harshly on small cultivators, and would not prevent thefts or disposal of stolen property.

(v) Fifthly, the High Commissioner does not see that any good would be gained by prohibiting licensed dealers from carrying on other business on the premises or by fixing their working hours. It would only impose harassing restrictions upon a legitimate trade, and thereby injure the small cultivator.

(vi) Sixthly, no justification has been shown for an alteration in the law so as to compel licensed dealers to balance their books daily; and Sir Arthur Young does not think that any benefit would be derived from it.

"10. In the light of the High Commissioner's views, as stated above, the Secretary of State regrets that he is unable to come to the same conclusions as were arrived at by the Standing Committee of the Planters' Association of Malaya, and that, therefore, he does not consider it desirable that effect should be given to the remedies proposed by the Committee."

11.—MILITARY SERVICE.

The SECRETARY states that a circular had been sent out by him (*vide* app. A), and the following was a summary of the replies received:

Districts.	No. of Europeans.	Labour.		Area in bearing.		Planted area.	
		Total No.	Per European.	Acres.	Per European.	Total acres.	Per European.
Batang Padang	53	8,036	151	16,617	313	23,827	449
Central Perak	63	9,262	147	21,694	344	28,978	460
Lower Perak	65	14,007	215	25,039	385	40,040	616
Taiping	66	10,446	158	19,761	300	31,543	478
Malay Peninsula Agricultural Association	135	21,183	157	53,950	400	65,544	487
Johore	151	19,921	132	53,045	351	69,036	457
Kelantan	22	2,382	108	4,904	223	8,198	373
Central Pahang	11	1,556	141	2,818	256	4,095	372
Negri Sembilan	183	27,319	150	64,369	352	88,577	484
Selangor	358	67,183	188	164,765	460	217,439	607
Total ...	1,107	181,295	164	426,962	386	577,277	521

Selangor.

Districts.	No. of Europeans.	Labour.		Area in bearing.		Planted area.	
		Total No.	Per European.	Acres.	Per European.	Total acres.	Per European.
Batu Tiga	38	4,907	129	14,868	391	20,225	532
Kajang	45	7,704	171	22,990	511	35,389	786
Kapar	43	8,603	200	21,986	511	23,066	536
Klang	40	7,927	198	19,138	478	25,919	648
Kuala Langat	38	8,258	217	15,724	414	22,330	590
Kuala Lumpur	49	7,758	158	20,878	426	27,324	558
Kuala Selangor	69	14,690	213	32,053	464	44,397	643
Ulu Selangor	36	7,336	203	17,128	476	18,789	522
Total ...	358	67,183	188	164,765	460	217,439	607

Mr. KINDERSLEY says that the new Military Service Bill had now been passed by the Federal Council and would soon come into operation. At the Federal Council Meeting he had submitted a resolution forwarded by the United Malaya Council which read as follows:

"That notwithstanding the announcement of the Government that married men will not be conscripted under the present Bill, this Council is very strongly of opinion that the cases of those men who have already gone home on active service, whether married or not, should, in accordance with what was stated in the Straits Legislative Council on 15th July, be referred to the Committee then promised to be constituted by Government; and that the said Committee should be selected much on the same lines as those adopted in the selection of the tribunals under the Bill.

"Further, that the passages of all men conscripted under the present Bill should be paid by the Government as a matter of course without enquiry into the financial status of the individuals affected."

He had not very much to add to what he had said at the Federal Council and the figures they had now obtained were certainly very instructive. His own opinion remained very much what it had been at their meeting in Seremban that if more men were really wanted by Government this country could send more. There were, however, two points which he would take this opportunity of clearing up:

1. His Excellency the High Commissioner at the recent meeting of the Federal Council said that he failed to understand the resolution of the United Malaya Council as to payment of passages, as for over two years they had given a second class passage to every man going home.

What His Excellency omitted was the final words of the resolution "without" etc.

2. The other point was that I was reported as having said "I am glad that His Excellency referred the previous day to the business community of the Federated Malay States having urged in 1916 the introduction of that Bill as I think that if the Bill as then suggested had been brought in, the present Bill would not have been necessary." What I actually did say was "I am glad that your Excellency referred yesterday to the fact that the business community of the Federated Malay States urged the Government in the year 1915 to bring in compulsory registration for military purposes as I think it will prevent misunderstanding of the present situation outside the Federated Malay States."

So far the rubber industry had not been seriously affected by the war and if shareholders did lose some of their money they would only be doing what a large number of shareholders in other industries had had to do. He certainly saw nothing derogatory in any company manager or agent objecting to their men leaving for active service but every estate should be judged on its own merits. He personally did not think that agents or managers would prevent "A" class men from leaving. The planters of Malaya had done splendidly and already a large number of men had gone to the

front, but because they had done that that was no reason why other men should say now that as they had done very well it was no longer necessary for them to do so now.

Mr. RITCHIE quite agrees with Mr. Kindersley but thinks there was some confusion as to what constituted "A" class. One heard of stories which made one believe that some of the medical examinations were of a most perfunctory nature. It obviously was no use sending away men who were useful here but who would only occupy beds in military hospitals at home.

Mr. GORDON-BROWN asks what the position of a married man was nowadays.

Mr. KINDERSLEY says that the Federal Council discussion explained the position. The protest of the Unofficial Members did not prevail against the High Commissioner's decision which was that men out here could not be treated differently from those at home. For the present, therefore, they were not going to take married men on active service and as regards others the Government took up the attitude that if they were paupers they would receive free passages which really amounted to a tax on thrifty men.

Mr. HARRISON wishes to know why a man should not be immediately told after medical examination how he had been classified.

Mr. KENNEDY says that everybody was told in Province Wellesley.

Mr. FERGUSON adds "and in Perak."

Mr. KENNEDY proposes that the Under Secretary be asked that the practice of telling men immediately after the examination as to how they had been classified should be made universal, and that all examiners be informed accordingly.

Mr. OKEDEN asks if Government were so anxious for men to go to the Front, why so many men were kept hanging about the country because they could not get orders to go.

Mr. CUMMING asks the Chairman what in his opinion was the minimum European supervision required.

Mr. KINDERSLEY thinks that 800 acres planted was a safe average especially if crop was to be cut down by 45 per cent. This of course did not mean that no inconvenience, etc., would thereby be caused and the average for the whole country had to vary according to districts.

Mr. RITCHIE thinks that this was necessarily a private opinion on the part of Mr. Kindersley and deprecates committing the Association to any figure whether it be 800 acres or any other, since the adoption of such a figure would greatly prejudice due consideration being given to each individual case.

Mr. GOOCH agrees that questions of health made a big difference in districts.

Mr. MCCULLOCH gives an example to the same effect.

Mr. MOOIJAART thinks that all the Chairman meant to say was that on the figures before them they could release about 300 men.

12.—COPRA.

The SECRETARY submits the following letter:

"KUALA LUMPUR,
"*8th July, 1918.*

"No. 2 in T. & C. 800/18.

"SIR,

"I have the honour to quote for the information of your Association the text of a circular of June, 1918, by the Secretary of State, Washington, to the American Consul-General, Singapore, regarding restrictions imposed by the United States War Trade Board on the importation of coconut meat into the United States of America after 30th June, 1918:

"'All import licences for coconut meat in any form whatsoever have been cancelled as to ocean shipping after 30th June. You should construe date of ocean shipment to mean the date of Bill of Lading. Forthwith no licences will be issued by the War Trade Board for the importation of broken meat of the coconut which is shredded, dessicated or prepared, otherwise called Ceylon copra. Licences may be granted for the importation of copra, that is to say, broken coconut meat which is not shredded, dessicated or prepared from Australia, East Indies, Central America and Mexico in amount not to exceed total of 5,200 long tons a month as the aggregate from all the countries named for remainder of the year 1918.'

"I have, etc.,

(Sd.) E. BURNSIDE,
"*Ag. Commissioner of Trade and Customs,*
"*Federated Malay States.*

"THE SECRETARY,
"PLANTERS' ASSOCIATION OF MALAYA,
"KUALA LUMPUR."

Mr. COOKSON points out that prices in Singapore were higher than in Penang which he believes was due to the fact that there was a demand for copra in Manila where there were large oil mills. He would, therefore, urge coconut planters to get in touch with the mills there and would be very pleased to supply addresses.

13.—VICE-CHAIRMAN.

The SECRETARY reports that the following nominations had been received:

(*a*) Mr. F. G. Harvey of Petaling Estate, nominated by the Negri Sembilan, Kuala Selangor, Klang, Kapar, Ulu Selangor, Batu Tiga, Johore, Batang Padang and the Malay Peninsula Agricultural Association;

(*b*) Mr. W. Duncan of Caledonia Estate, nominated by the Kelantan Planters' Association;

(*c*) Mr. J. D. McCulloch of Perhentian Tinggi, nominated by the Taiping Planters' Association, who failing him had also nominated

(*d*) Mr. J. W. Kennedy of Gula Estate.

Messrs. Duncan, McCulloch and Kennedy having declined to stand, the only nomination before the meeting, therefore, was that of Mr. Harvey.

Mr. KINDERSLEY says he was very glad to see the practical unanimity with which Mr. Harvey had been nominated, showing what extremely hard work he had done for the Association. Mr. Harvey had always been ready to help and to advise and he had great pleasure in declaring Mr. Harvey duly elected Vice-Chairman of this Association. (Applause.)

Mr. HARVEY returns his thanks to the members for his election.

14.—RUBBER RESEARCH.

The SECRETARY reports that Dr. E. J. Butler of the Imperial Department of Agriculture in India having been deputed by the Colonial Office to enquire into and report on schemes for the better organization and co-ordination of rubber research in this country, the Standing Committee had suggested the formation of a Committee to consider the matter as follows:

Mr. H. Armstrong	Mr. J. W. Kennedy
„ C. Bell	The Hon'ble Mr. R. C. M. Kindersley
„ G. H. Bennett	Mr. P. G. Lawford
„ C. W. Bradburne	„ J. D. McCulloch
„ C. Bradbery	„ Thos. H. Menzies
„ W. de L. Brooke	„ A. B. Milne
„ J. L. Campbell	„ L. Mooijaart
„ W. S. Cookson	„ H. R. Quartley
„ J. S. Ferguson	„ C. Ritchie
„ J. French	„ M. Strivens
„ F. G. Harvey	

Two representatives of the Malayan Association of Rubber Producers (1 Chinese, 1 European)

The Director of Agriculture, F. M. S.

Mr. Gallagher

Dr. Butler, and 1 representative each of the following firms:

Messrs. Societe Financiere des Caoutchoucs
„ Harrisons & Crosfield, Ltd.
„ Whittall & Co.
„ Guthrie & Co., Ltd.
„ Cumberbatch & Co., Ltd.
„ Boustead, Hampshire & Co., Ltd.
„ Barlow & Co.
„ Sime, Darby & Co., Ltd.
„ Planters' Stores & Agency Co., Ltd.

Dr. BUTLER considers the feeling practically unanimous in favour of taking a further step in developing scientific research in the rubber industry. The first essential would be to secure co-ordination between the men already working here on the subject, somewhat on the lines of the present Brown Bast Committee, and in order to meet that demand it had, therefore, seemed the best way to get together a large Committee to co-operate with him and out of this large Committee no doubt later on a small working Sub-Committee had best be formed.

Mr. KENNEDY had intended to speak on the subject as he felt strongly the need for a proper scheme for organizing research work, but as Dr. Butler had the matter in hand there was no need for him now to press this matter further. But he just wished to point out that they ought to have one Rubber Research Department for rubber only and one which would serve the whole Peninsula. The well-known American Company in Sumatra he might instance with about 40,000 acres employed 12 scientists and their expenditure on research work worked out at about $3 per acre whilst in this country it worked out at about 12 cents per acre.

Mr. GRAY suggests that the name of Mr. R. H. Phillips be added to the list proposed by the Standing Committee.

Mr. KENNEDY suggests that Mr. Duncan's name be added and enquires why no other scientists had been put on the Committee.

Mr. MCCULLOCH explains that the reason was that this Committee would be able to take their evidence and that it was not advisable to have these employees of various bodies as members on the Committee.

Mr. KINDERSLEY then puts it to the meeting that the Committee be appointed as suggested by the Standing Committee with the addition of Messrs. Duncan and Phillips.

This is agreed to.

The SECRETARY is instructed to call a meeting of this Committee for 10.30 a.m. on 8th September.

15.—ROADS.

Mr. BROOKE calls attention to the state of roads throughout the Peninsula, more particularly to the Ulu Selangor section of the main trunk road to Penang. The Public Works Department had now for years observed a masterly inactivity in this respect and he urged that it was a matter for the whole community to insist that at least main trunk roads be kept open and free from flooding all the year round. The section he was speaking about was subject to silting and flood damage and he would now move that a letter be written to the Government urging upon them the necessity of taking steps to make and keep the main trunk roads passable under all weather conditions.

Mr. DAKEYNE seconds the proposal and points out that as the damage was mainly due to tin mining it would seem a good plan to earmark part of the revenue obtained from tin for undoing all the damage that mining had caused to roads and rivers.

Mr. KINDERSLEY feels that as trunk roads were used by the whole community it certainly was up to the Planters' Association of Malaya to support the motion which emanated from the Ulu Selangor District Planters' Association.

The proposal is then put to the meeting and carried unanimously.

16.—QUININE.

Mr. HICKSON points out that four months ago quinine was sold at $42 per kilo. On rumours that the supply from Java would be stopped the price had since then been forced up to $64 per kilo. From enquiries made it seemed that Asiatic firms were trying to corner the supply and thereby boost prices. From his own experience he had applied to a number of European firms for a supply who all replied that they were out of stock whilst Asiatic firms could supply although of course at greatly enhanced prices. He would, therefore, urge that Government regulate prices and ensure an adequate supply.

Mr. HARRISON seconds the proposal which is carried.

Mr. QUARTLEY enquires whether it would not be possible for them to grow their own quinine.

Col. FOX points out that Cinchona requires an elevation of 3,000 feet.

Mr. OKEDEN adds that it takes six years to get quinine from Cinchona.

Mr. LEWTON-BRAIN informs the meeting that Cinchona grew quite well in the hills here.

17.—TODDY.

Mr. OKEDEN draws attention to the Chief Secretary's Report for the year 1917 where allusion was made to tests taken in respect of the adulteration of toddy. As suggested by his Association he would, therefore, now move that Government be asked for a statement as to the localities and shops from which samples for acidity and adulteration tests were taken.

Mr. MOOIJAART considers the request eminently reasonable and seconds the proposal which is carried.

18.—UNITED MALAYA COUNCIL.

Mr. KINDERSLEY says as they were all aware this new body had recently been constituted and the minutes of the inaugural meeting were now laid on the table. From this they would see that the Planters' Association of Malaya was given 17 delegates and it now remained for this meeting to decide how these delegates were to be appointed.

Mr. MOOIJAART suggests that nominations be made now.

Mr. MCCULLOCH thinks it preferable to leave nominations to the Standing Committee, and the Secretary is instructed accordingly.

The meeting terminates at 3.30 p.m.

H. C. E. ZACHARIAS,
Secretary.

APPENDIX A.

PLANTERS' ASSOCIATION OF MALAYA.

To the Secretary,
Planters' Association of Malaya,
Kuala Lumpur.

URGENT.
Please reply by return post.

NAME OF ESTATE..... District.....
Form of Cultivation.....
Area in Bearing.....acres. Area planted, but not in Bearing.....acres.
Is Rubber cured on Estate?.....
Class of Labour employed and number?.....

Name of Staff Managers, Assistants, etc.	Age.	Nationality.	Number of years in East.	Number of years since last leave.	Number of years on the Estate.	Married or Single.	Is Wife out here?	Number of Children.		Previous Military Service if any.	State of health.
								At home.	Out here.		
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
Other Europeans											

REMARKS BY MANAGER.

.....
Manager or Agent.

Abstract of Meteorological Readings in the various Districts of Malaya for the month of April, 1918.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Kelantan, Kota Bahru	...	145.6	81.4	91.03	72.36	18.66	77.4	.860	74.7	80.0	...	8.42	3.25
Pahang, Kuala Lipis	...	...	81.24	90.0	73.33	16.67	74.41	...	...	...	...	11.96	1.76
Johore, Johore Bahru	...	...	...	88.43	72.65	...	...	...	...	...	...	13.95	2.81
Singapore, Kandang Kerbau ...	29.790	158.0	82.6	87.5	73.6	13.9	76.6	.864	...	78.0	...	8.63	1.57
Malacca, Durian Daun ...	29.836	147.0	81.0	88.0	72.0	16.0	77.0	.911	...	80.0	S.W.	4.51	1.29
Negri Sembilan, Seremban ...	...	150.1	79.6	88.4	72.0	16.4	74.9	.772	71.5	76.0	S.W.	9.57	2.44
„ Kuala Pilah ...	...	143.5	81.3	90.0	71.5	18.5	78.7	.932	76.9	86.0	...	4.88	1.37
„ Port Dickson...	...	120.2	81.5	86.7	74.0	12.7	77.5	.863	75.0	80.5	...	8.31	4.07
Selangor, Kuala Lumpur ...	29.785	148.5	80.4	88.9	72.8	16.1	76.1	.819	72.8	78.0	Calm	9.64	4.09
„ Klang	...	...	80.3	85.5	73.2	12.3	76.1	...	...	...	...	2.44	1.12
„ Kuala Selangor ...	...	...	...	89.4	74.2	15.2	...	...	...	...	...	5.13	1.08
„ Rawang	...	...	...	91.1	...	...	...	...	...	...	...	6.47	.80
Perak, Telok Anson	...	...	81.24	92.0	70.0	22.0	78.31	.932	...	89.0	...	8.62	1.77
„ Ipoh	...	...	80.80	93.0	70.0	23.0	76.27	.844	73.27	80.0	...	11.62	2.32
„ Taiping	...	112.0	80.41	92.0	69.0	23.0	76.83	.876	...	85.0	...	16.79	2.20
„ The Cottage	...	...	...	...	...	...	...	...	...	...	...	44.05	5.90
„ Parit Buntar	...	...	82.40	94.0	71.0	23.0	77.85	.892	...	81.0	...	6.99	1.96
Penang, Georgetown	29.764	146.6	82.8	89.7	72.0	...	77.3	.874	73.8	78.3	S.E.	8.52	1.77
Kedah, Alor Star	...	...	...	...	...	...	...	...	...	...	...	9.21	2.04
Perlis, Kangar	...	...	...	90.20	73.17	17.03	...	...	...	...	...	11.21	2.75

Abstract of Meteorological Readings in the various Districts of Malaya for the month of May, 1918.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Kelantan, Kota Bahru	...	147.0	82.6	92.51	73.35	19.16	78.2	.874	75.2	78.0	...	2.71	1.82
Pahang, Kuala Lipis	...	...	81.31	89.45	74.25	15.19	76.19	...	...	...	...	7.49	3.05
Johore, Johore Bahru	...	...	...	88.81	73.51	...	...	...	...	...	...	6.83	1.60
Singapore, Kandang Kerbau ...	29.771	165.0	82.9	87.5	74.4	13.1	78.4	.904	...	81.0	...	7.60	1.81
Malacca, Durian Daun	29.822	145.0	82.0	88.0	73.0	15.0	78.0	.919	....	81.0	S.W.	3.20	1.49
Negri Sembilan, Seremban ...	...	151.4	79.8	86.7	74.4	12.3	75.3	.781	72.4	78.1	N.W.	4.96	1.41
,, Kuala Pilah ...	...	139.5	80.7	88.3	69.6	18.7	77.8	.905	75.9	85.4	...	9.68	2.44
,, Port Dickson...	...	121.3	83.3	88.2	75.1	13.1	78.4	.872	77.6	77.06	...	5.12	1.27
Selangor, Kuala Lumpur ...	29.789	147.8	81.3	89.3	73.1	16.2	77.7	.883	75.4	82.0	Calm	7.57	2.24
,, Klang	...	...	81.3	86.0	73.9	12.1	77.0	...	...	...	...	4.27	1.57
,, Kuala Selangor ...	...	...	...	89.6	75.3	14.2	...	...	...	...	...	4.92	1.59
,, Rawang	...	...	...	92.9	...	...	...	...	...	...	...	10.57	3.05
Perak, Telok Anson	...	...	83.04	92.0	71.0	21.0	79.54	.947	...	81.0	...	8.77	2.55
,, Ipoh	...	...	83.28	95.0	71.0	21.0	77.43	.864	74.39	77.0	...	10.23	1.88
,, Taiping	...	112.0	82.50	96.0	70.0	26.0	77.80	.890	...	81.0	...	7.99	1.84
,, The Cottage	...	...	...	...	...	...	...	...	...	...	...	13.14	2.0
,, Parit Buntar	...	...	83.13	94.0	71.0	23.0	78.27	.902	...	81.0	...	2.28	.78
Penang, Georgetown	29.759	146.0	82.3	86.0	72.7	...	79.0	.930	76.8	81.6	N.W.	4.09	1.61
Kedah, Alor Star	...	...	...	...	...	...	...	...	...	...	...	3.37	.83
Perlis, Kangar	...	...	...	89.80	73.93	15.87	...	...	...	...	...	5.05	1.56

Abstract of Meteorological Readings in the various Districts of Malaya for the month of June, 1918.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Kelantan, Kota Bahru	...	145.0	82.8	92.16	72.56	19.60	76.7	.801	72.6	71.0	...	5.12	0.94
Pahang, Kuala Lipis	...	...	80.85	89.5	73.46	16.03	76.06	...	...	...	...	7.60	2.81
Johore, Johore Bahru	...	...	...	86.32	72.75	...	...	...	...	...	...	12.18	3.70
Singapore, Kandang Kerbau ...	29.799	155.0	82.2	87.1	73.9	13.2	74.1	.872	...	79.0	...	13.56	2.87
Malacca, Durian Daun ...	29.838	142.0	81.0	87.0	72.0	15.0	77.0	.881	...	82.0	S.W.	8.16	1.18
Negri Sembilan, Seremban ...	...	151.0	79.7	87.3	73.2	14.1	74.5	.756	69.5	76.4	S.W.	5.36	1.29
,, Kuala Pilah ...	...	144.3	81.9	90.5	70.2	20.3	78.9	.950	76.9	85.1	...	6.81	1.78
,, Port Dickson...	...	116.7	82.3	86.9	74.3	12.6	77.7	.852	76.5	77.4	...	3.89	1.06
Selangor, Kuala Lumpur ...	29.791	144.9	80.8	89.4	72.8	16.6	77.1	.859	74.5	81.0	S.W.	6.06	1.24
,, Klang	...	...	80.2	85.0	73.2	11.8	74.9	...	...	...	...	5.87	1.83
,, Kuala Selangor ...	...	...	...	88.4	74.1	14.3	...	...	...	...	...	3.44	.51
,, Rawang	...	...	...	92.9	...	...	...	...	...	...	...	4.76	.98
Perak, Telok Anson	...	...	81.87	92.0	70.0	22.0	78.59	.933	...	87.0	...	6.29	1.81
,, Ipoh	...	...	81.39	93.0	69.0	24.0	76.40	.846	74.10	80.0	...	6.72	1.65
,, Taiping	...	111.0	81.52	93.0	69.0	24.0	77.20	.878	...	83.0	...	11.57	3.93
,, The Cottage	...	...	...	...	...	...	...	...	...	...	...	29.20	3.70
,, Parit Buntar	...	...	81.80	92.0	70.0	22.0	77.24	.874	...	81.0	...	5.83	1.41
Penang, Georgetown	29.785	150.0	84.7	92.0	69.0	23.0	78.7	...	74.4	...	...	8.70	2.20
Kedah, Alor Star	...	...	...	...	...	...	...	...	...	...	...	7.10	1.10
Perlis, Kangar	...	...	...	88.56	73.26	15.30	...	...	...	...	...	11.14	3.21